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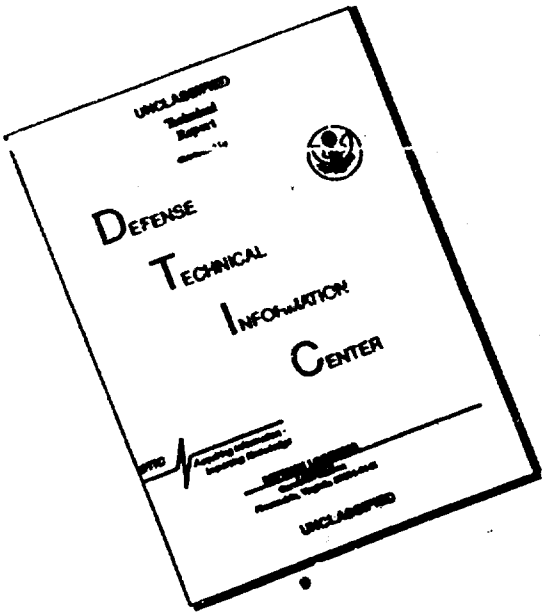

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FINDING OF NO SIGNIFICANT IMPACT

NAME OF ACTION: GROUND WAVE EMERGENCY NETWORK
SOUTH CENTRAL MONTANA RELAY NODE

DESCRIPTION OF PROPOSED ACTION ALTERNATIVES:

The U.S. Air Force plans to construct a radio communications relay node in south central Montana (Park County) as part of the Ground Wave Emergency Network (GWEN) communications system. Six action alternatives associated with six candidate GWEN sites (CGSs) in south central Montana and the no action alternative have been considered and evaluated in an environmental assessment (EA).

GWEN is a radio communications system designed to relay emergency messages between strategic military areas in the continental United States. The system is immune to the effects of high-altitude electromagnetic pulse (HEMP) energy surges caused by nuclear detonations in the ionosphere that would disrupt conventional communications equipment. A failure of such equipment would prevent timely communications among top military and civilian leaders and strategic Air Force locations and prevent U.S. assessment and retaliation during an attack. GWEN is an essential part of a defense modernization program to upgrade and improve our nation's communications system, thereby strengthening deterrence.

The GWEN system is a network of relay nodes, receive-only stations, and input/output stations. The relay node in south central Montana would be part of the Final Operational Capability (FOC) phase of the GWEN system and would establish essential links with adjacent nodes in the network.

In September 1987, the U.S. Air Force Electronic Systems Division, Hanscom Air Force Base, Massachusetts published a Final Environmental Impact Statement (FEIS) for the GWEN FOC that addressed the system as a whole and identified expected environmental effects common to all sites. Section 5 of the FEIS described a siting process that is designed to minimize the potential for environmental impacts. This process has three distinct phases: network definition, regional screening, and individual site evaluation. Network definition identified the need for a relay node in south central Montana. Regional screening resulted in the identification of six CGSs in south central Montana that met the exclusionary and evaluative criteria described in that FEIS. Individual site evaluation examined the relative suitability of the CGSs through site-specific technical studies. The EA is a part of the third phase and is tiered from that FEIS. It addresses the potential environmental effects of the six action alternatives and the no action alternative.

The proposed relay node in south central Montana will be an unmanned facility located on approximately 11 acres of land and, once constructed, will resemble an AM radio broadcast station. The facility will consist of a 299-foot-tall, low-frequency (LF) transmitter tower, three equipment shelters, an access road, and associated fences. The tower will be supported by 24 guy wires, including 12 top-loading elements. An equipment shelter at the tower base will contain an antenna tuning unit. An 8-foot-high chain link fence topped with barbed wire will surround the tower base and associated equipment shelter. A radial ground plane, composed of 100, 0.128-inch-diameter copper wires buried about 12 inches underground, will extend out about 330 feet from the tower base. A 4-foot-high fence will be installed around the perimeter of the copper radials.

A second equipment area located at the site perimeter will contain two shelters housing a back-up power group (BUPG) with two internal fuel storage tanks and radio processing equipment. The BUPG will operate during power outages and for testing purposes. An LF receive antenna, consisting of a pair of 4-foot-diameter rings mounted on a 10-foot pole, and an ultrahigh-frequency (UHF) antenna, used for communicating with airborne input/output terminals and consisting of a 9-foot-high whip-like antenna mounted on a 30-foot-high pole, will also be located in this area. An 8-foot-high chain link fence topped with barbed wire will enclose the entire equipment area. A 10-foot-wide gravel road will connect this area to the tower base. A 12-foot-wide gravel road will provide access to the site from a public road.

The station will use existing commercial three-phase electric power and telephone service. Power and telephone service will be brought to the site through either overhead or buried lines, depending on local utility practices. In its ready status, the antenna will transmit in the LF radio band at 150 to 175 kilohertz for a total of 6 to 8 seconds per hour.

Two action alternatives are discussed in this Finding of No Significant Impact (FONSI). The Sarrazin site (CGS-1) would have significant impacts on historic properties. The O'Hair-South site (CGS-12B) would have significant visual impacts. Complete impacts are unknown on the Foster (CGS-2), O'Hair-North (CGS-12A) and O'Hair-South (CGS-12B) sites because these sites were withdrawn before the cultural resources studies could be completed. These four sites will therefore not be considered in this FONSI.

ANTICIPATED ENVIRONMENTAL EFFECTS

The environmental assessment evaluated potential impacts to the physical, biological, and socio-cultural environment from construction and operation of the relay node.

The project would have no significant impacts on physical resources. Erosion and increased runoff would be minimized by using proper erosion control techniques during construction and by replanting the site afterwards. Impacts to mineral resources would be minor. Paleontological resources are not likely to occur on the sites; therefore significant impacts to them are not anticipated. No prime farmland would be removed from production. Water quality would not be significantly affected because increases in copper concentrations due to corrosion of the ground plane would be negligible. Air quality would not be significantly affected. During construction, temporary and insignificant increases in emissions would occur, and during operation, emissions from the BUPG would not be sufficient to result in violation of air quality standards.

The project would have no significant impacts on biological resources. The sites are located on agricultural fields or rangeland and do not contain sensitive wildlife habitat. The sites are not within 300 feet of wetlands, nor are they within a 100-year floodplain. Informal consultation with the U.S. Fish and Wildlife Service indicated that the project would not likely adversely affect any threatened or endangered species. The Montana Natural Heritage Program indicated that no state-listed rare, threatened, or endangered species or unique biological community would be affected by the project. Bird-tower collisions may occur but would not be significant because the tower would be located away from primary bird habitats and migration routes.

The project would have no significant impacts on socio-cultural resources. Construction would have a small, beneficial impact on the local economy, in part by providing temporary employment for contractors and construction workers. Community support systems would not be significantly affected. Land use and noise impacts would not be significant. The relay node signal would not interfere with commercial television or radio broadcasts, amateur radio operations, garage door openers, or pacemakers. Radio-frequency emissions outside the fenced area around the tower base would not pose a health hazard to humans or animals. The Montana Historical Society was consulted and has concurred that the project would not affect significant cultural resources. Significant impacts to Native American traditional, religious or sacred sites are not anticipated. A visual analysis conducted in accordance with the criteria developed in the FOC FEIS concluded that the relay node facility would not cause significant visual impacts.

CONCLUSIONS:

No significant impacts to the surrounding environment would be caused by construction and operation of the proposed relay node on the Watson (CGS-4) or Meigs (CGS-9) site. Therefore, an environmental impact statement for a GWEN relay node at this location in south central Montana is not required.

David O. Williams, Colonel, USAF
Chairman
HQ ESC Environmental Protection Committee

25 Feb 93
Date

PREFERRED GWEN SITE REPORT
SOUTH CENTRAL MONTANA

The U.S. Air Force is proposing to construct a relay node for the Ground Wave Emergency Network (GWEN) in south central Montana. The Air Force has followed the siting process described in Section 5 of the Final Environmental Impact Statement (FEIS) for the Final Operational Capability (FOC) phase of the GWEN program to identify alternative Candidate GWEN Sites (CGSs). The six CGSs identified in south central Montana are referred to as the Sarrazin, Foster, Watson, Meigs, O'Hair North, and O'Hair South sites.

This report summarizes the process of selecting the preferred site from the six CGSs. This PGSR, along with a site-specific Environmental Assessment (EA) and Finding of No Significant Impact (FONSI), is being distributed for information and comment in compliance with the Air Force's process of Interagency and Intergovernmental Coordination for Environmental Planning (IICEP).

Operational, environmental, and developmental suitability; construction and real estate acquisition costs; and public comments and concerns are all factors which have been considered in arriving at the selection of the preferred site.

Without an **operationally suitable** location, connectivity of the relay node in south central Montana to the GWEN network cannot be achieved. Ground conductivity measurements are acceptable at all six CGSs. During the site-specific studies, no radio frequency interference was detected in the GWEN frequency bands which would interfere with the operation of the GWEN receiver. Also, operations at any of the sites would pose no interference with other known systems. Therefore, all six sites are operationally suitable.

The next major factor considered in the selection of the preferred site was **environmental suitability**. The environmental suitability of each CGS was determined from information provided by an independent field analysis and is documented in the EA. The EA for the six CGSs was completed in February 1993. The environmental analysis found that no significant impacts would result from construction of a GWEN relay node at the Watson and Meigs sites. Historic structures surveys for the O'Hair North and O'Hair South sites could not be completed since the landowner withdrew the sites; therefore, these sites cannot be assumed to be environmentally suitable. The environmental analysis found that construction of a GWEN relay node at the Sarrazin and Foster sites would have significant impacts to historic properties, and construction at the O'Hair South site could have significant visual impacts. A FONSI for the Watson and Meigs sites was completed on 25 February 1993. Thus, two of the six CGSs are environmentally suitable, and neither of these two is environmentally favored over the other.

The six sites are all **suitable for development** as a GWEN relay node. The FAA has approved construction of the GWEN relay node at any of these six CGSs. **Construction costs** is also a consideration in the selection of the preferred site. Construction costs for the two operationally, environmentally, and developmentally suitable sites are acceptable, with the Watson site favored due to lower expected costs.

Real estate negotiations have been completed for the Sarrazin, Watson, and Meigs sites; the owner of the Meigs site is willing to lease or sell the property, while the owner of the Sarrazin site is willing to lease only. The owner of the Watson site is no

longer willing to sell or lease his land to the Government due to subsequent agreements between parties other than the Air Force. The owners of the Foster, O'Hair North, and O'Hair South sites announced their desire to be withdrawn from consideration during negotiations and, therefore, a negotiated amount for either lease or purchase could not be reached. Thus, of the three sites for which negotiations have been completed, the Meigs site is favored.

With operational, environmental, and developmental factors evaluated and acquisition and construction costs considered, the Air Force prefers the Meigs site. The Meigs site is preferred because it is operationally, environmentally, and developmentally suitable; and has acceptable real estate acquisition and construction costs.

I have therefore selected the Meigs site as the Air Force's preferred site for development as the GWEN relay node in south central Montana. After reviewing the information received during the IICEP process, I will direct the final land acquisition activities and construction of the GWEN relay node.

STEPHEN T. MARTIN, LT COL, USAF
Program Manager, GWEN

1 MAR 1983
(Date)

GROUND WAVE EMERGENCY NETWORK
FINAL OPERATIONAL CAPABILITY

ENVIRONMENTAL ASSESSMENT
FOR
SOUTH CENTRAL MONTANA RELAY NODE

SITE NO. RN 8C925MT

11 February 1993

Electronic Systems Center
Air Force Material Command, USAF
Hanscom AFB, Massachusetts 01731-1623

GROUND WAVE EMERGENCY NETWORK
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SUMMARY

The Ground Wave Emergency Network (GWEN) is a radio communication system designed to relay emergency messages between strategic military areas in the continental United States. The system is immune to the effects of high-altitude electromagnetic pulse (HEMP) energy surges caused by nuclear bursts in the ionosphere that would disrupt conventional communications equipment such as telephones and shortwave radios. A failure of such equipment would prevent timely communications among top military and civilian leaders and strategic Air Force locations and prevent U.S. assessment and retaliation during an attack. GWEN is an essential part of a defense modernization program to upgrade and improve our nation's communications system, thereby strengthening deterrence.

The GWEN system consists of a network of relay nodes, receive-only stations, and input/output stations. Each relay node, such as the one proposed in south central Montana, consists of a guyed radio tower facility similar to those used by commercial AM broadcast transmitters.

A Final Environmental Impact Statement (FEIS) for the GWEN Final Operational Capability (FOC) was published in September 1987 by the Electronic Systems Division, Hanscom Air Force Base, Massachusetts. That FEIS addressed the GWEN system as a whole, identifying expected environmental effects common to all sites. Section 5, beginning on page 5-1 of the FEIS describes a siting process that is designed to minimize the potential for environmental impacts. This process has three distinct phases: network definition, regional screening, and individual site evaluation.

Phase 1, network definition, identified the geographic coordinates that met the operational needs and technical constraints of the network. Each set of coordinates became the center of a circular site search area (SSA) with a 9-mile radius (250 square miles). The SSA discussed in this Environmental Assessment (EA) was centered 0.6 mile southeast of the town of Livingston in Park County, in south central Montana, at latitude 45.65° N and longitude 110.55° W. The only town in the SSA is Livingston.

Phase 2, regional screening, involved the application of exclusionary and evaluative criteria to the SSA to avoid environmentally sensitive areas. The remaining areas, called potential areawide sites (PAWS), became the focus of the siting process. The field investigation for south central Montana was conducted in July 1989. Eighteen sites were identified during automobile-based surveys as potential candidate GWEN sites (PCGSs), some of which were located outside of the SSA due to the limited number of suitable candidate sites within SSA boundaries. The sites identified outside of the SSA were evaluated under the same FEIS siting criteria as the sites within the SSA. All PCGSs were located in Park County. Attempts were made to contact the owners of the sites to determine their interest in selling or leasing land to the Government. Rights-of-entry were granted to investigate eleven PCGSs. Following evaluation against the environmental criteria set forth in the FEIS, six of the eleven PCGSs were recommended as candidate GWEN sites (CGSs) for further review. These CGSs were described in the Preliminary Site Evaluation Report (PSER) of October 20, 1989.

Subsequent to the PSER being issued and site-specific studies being accomplished, three CGS landowners withdrew four sites from consideration (Foster, CGS-2; O'Hair-North, CGS-12A; O'Hair-South, CGS-12B; and Watson, CGS-4). These landowners are no longer interested in leasing or selling their land to the Air Force. However, since many of the site-specific studies had been accomplished on these sites prior to the owners' withdrawal and because these sites continue to be considered as viable alternatives, the Air Force has presented this data on the withdrawn sites in this EA.

Phase 3, individual site evaluation, involves evaluating the relative suitability of the candidate sites through site-specific technical studies. This EA is a product of those evaluations and discusses the six siting alternatives in south central Montana. It addresses only those criteria that apply to the candidate sites. The seventh alternative, no action, would impair performance of the GWEN system but leave the environment unchanged.

To be suitable for construction and operation, a site should measure at least 700 by 700 feet (approximately 11 acres), be relatively level and undeveloped, be free of natural or

man-made obstructions, and have soils capable of supporting relay node structures. The site should also be close to all-weather roads, commercial three-phase power, and telephone lines to minimize costs. To operate effectively, the site must be located at least a minimum distance from obstructions that could affect reception and transmission. These include buildings and towers, high-voltage power lines, and other communications systems or sources of radio-frequency interference. Specific minimum distances depend on height and power levels of identified obstructions or interfering sources.

This EA shows that construction and operation of a GWEN relay node on the Sarrazin (CGS-1) or the O'Hair-South (CGS-12B) site would have a significant impact. The Sarrazin site would have a significant impact on historic properties and the O'Hair-South site would have significant visual impacts. These impacts are discussed in Sections 4.2 and 4.7 of this EA. Although the Foster site (CGS-2) was withdrawn before the archaeological and historic structure surveys were undertaken, a significant impact on historic properties is expected for reasons discussed in Section 4.3 of this EA. The O'Hair-North (CGS-12A) and O'Hair-South (CGS-12B) sites were withdrawn after the archaeological surveys but before the historic structure surveys were conducted, so the potential for impacts on historic properties at these sites has not been completely determined.

This EA shows that construction and operation of a GWEN relay node on two of the six sites would have no significant impacts (Watson, CGS-4 and Meigs, CGS-9). During the 6-week construction period, the project would cause temporary and insignificant air quality and noise impacts and slight increases in traffic. It would have a small, beneficial impact on the local economy, in part because it would provide temporary employment for contractors and construction workers. If built on either of the above sites, the project would have no significant impacts on air quality; water quality; land use; mineral resources; known paleontological resources; biological resources, including threatened and endangered species; or cultural resources that are listed, eligible, or potentially eligible for listing on the National Register of Historic Places. Visual impacts would not be significant. Radio-frequency emissions outside the fenced area around the tower base would not pose a health hazard to humans or animals.

1.0 PURPOSE AND NEED FOR ACTION

The proposed action covered by this Environmental Assessment (EA) includes construction and operation of a relay node of the Ground Wave Emergency Network (GWEN) in south central Montana (see Figure1.1 of this EA). This relay node will provide essential connections with adjacent nodes in the network. The major features of a GWEN relay node and associated environmental impacts common to all sites are addressed in the Final Environmental Impact Statement (FEIS) for the Final Operational Capability (FOC) phase of GWEN, which was published in September 1987 by the Electronic Systems Division, Hanscom Air Force Base, Massachusetts. This EA is tiered from that FEIS and addresses site-specific conditions at the candidate GWEN sites (CGSs) for this particular site search area (SSA).

The purpose of GWEN is to provide to the President and the National Command Authority a strategic communications network that is immune to the effects of high-altitude electromagnetic pulse (HEMP) and will carry critical attack warning and force execution data. As a result, GWEN will remove any possibility of potential aggressors taking advantage of the electromagnetic pulse generated by a high-altitude nuclear burst. A HEMP surge would disrupt the nation's electric power line transmission capability, cripple electronic devices, and adversely affect skywave communications networks based on conventional electronics. GWEN provides a low-frequency (LF) ground wave communication network that will not be affected by HEMP effects. It thereby strengthens deterrence by removing the option of beginning an attack against the United States by using HEMP effects.

A partial GWEN network, called the Thin Line Connectivity Capability (TLCC), has been completed. It contains 8 input/output stations, 30 receive-only stations, and 54 relay nodes. The TLCC provides a limited level of HEMP-protected communications to strategic forces and the National Command Authority.

The FOC phase of GWEN will add 29 relay nodes. The FOC will allow communication along several routes, thereby enhancing system availability and ensuring that vital communications will be maintained.

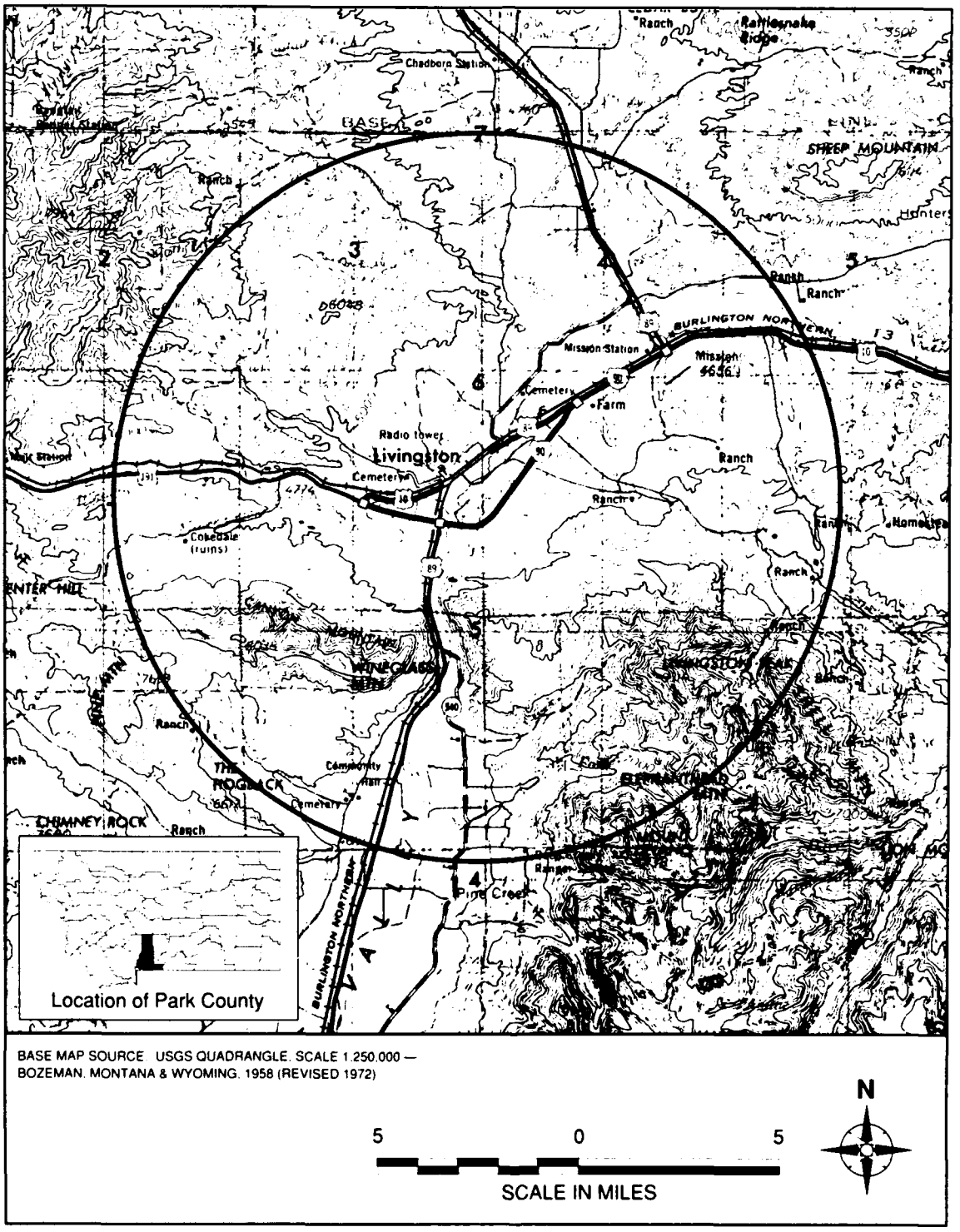

FIGURE 1.1 SOUTH CENTRAL MONTANA SITE SEARCH AREA (SSA), PARK COUNTY, MONTANA

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

The six action alternatives are site-specific applications of the standard relay node design presented in the FEIS. Consequently, they share a number of features that are discussed in Section 2.1 of this EA. The site-specific features are discussed in Sections 2.2 through 2.7 of this EA. Site descriptive data was obtained during field investigations conducted in July 1989. Figure 2.1 of this EA shows the six CGSs in relation to the major features of the SSA. Figure 2.2 and Appendix B of this EA show the locations of the CGSs in relation to local roads and surrounding topography, respectively.

2.1 Common Features of the Action Alternatives

2.1.1 Site Selection Process

The process used to select sites is described in Section 5, beginning on page 5-1 of the FEIS. This process has three distinct phases: network definition, regional screening, and individual site evaluation. Appendix A of this EA provides a diagram of the site selection process. The environmental criteria used in this process are defined in Tables 5-1 and 5-2, pages 5-7 through 5-14 of the FEIS.

Phase 1, network definition, involved locating network nodes to optimize their performance while serving a predetermined number of users. A typical GWEN ground wave has an effective range of about 150 to 200 miles. Thus, relay nodes could not be located independently; changing the location of one would affect the connectivity with other nodes in the network. Once the optimal coordinates of the relay nodes were identified, a 9-mile-radius SSA was defined around each point to provide suitable opportunity for siting a relay node near that point. The 9-mile radius was chosen because it provided a reasonably sized search area consistent with the technical constraints on the relay node. If a significant portion of an SSA fell within an environmentally highly sensitive area such as a national park or wilderness area, an alternative was selected and its connectivity evaluated. This process was repeated until all relay nodes fell outside such areas.

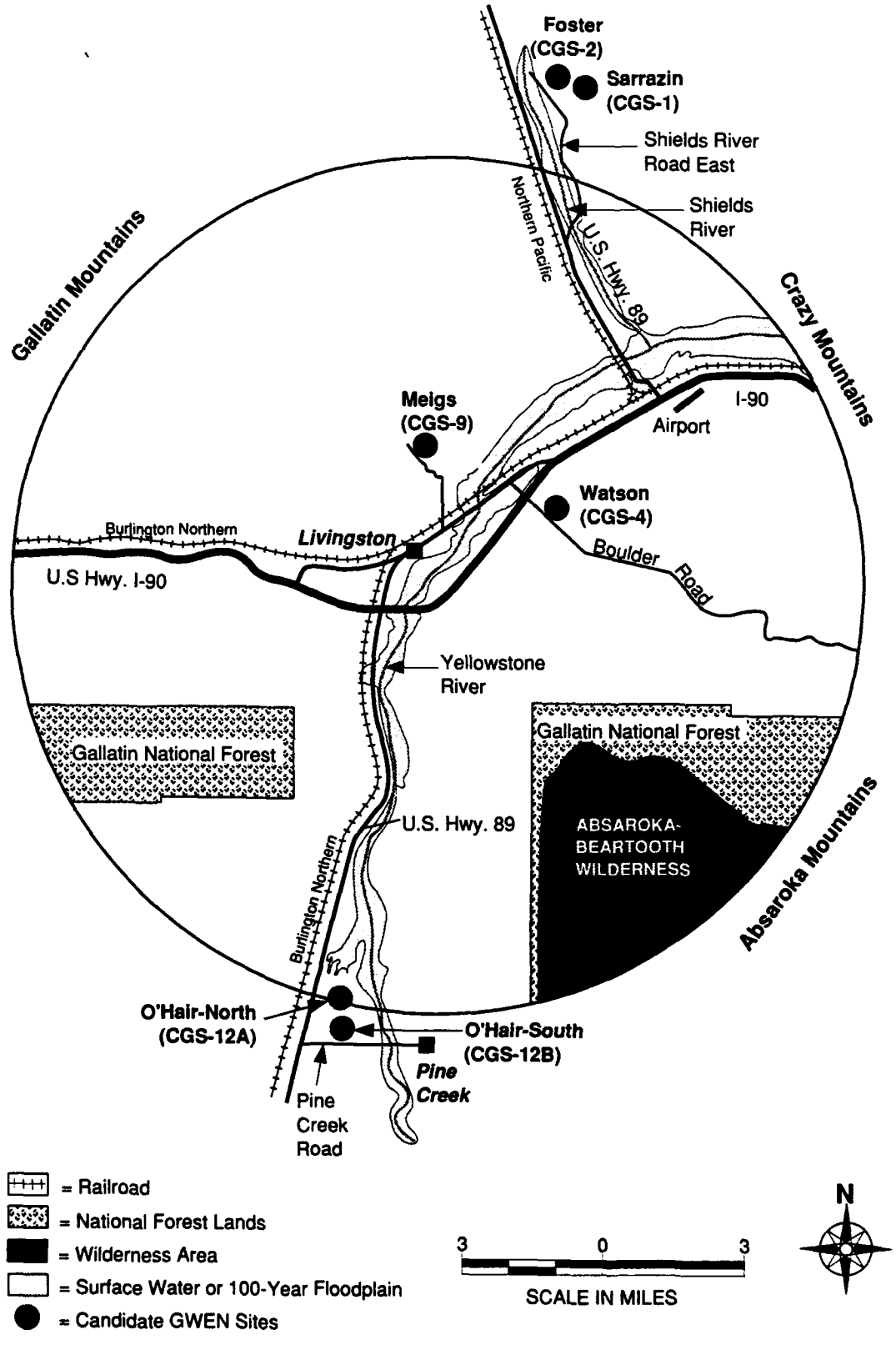

FIGURE 2.1 LOCATIONS OF CANDIDATE GWEN SITES (CGS) RELATIVE TO SELECTED MAJOR FEATURES AND ROADS WITHIN AND NEAR THE SOUTH CENTRAL MONTANA SITE SEARCH AREA

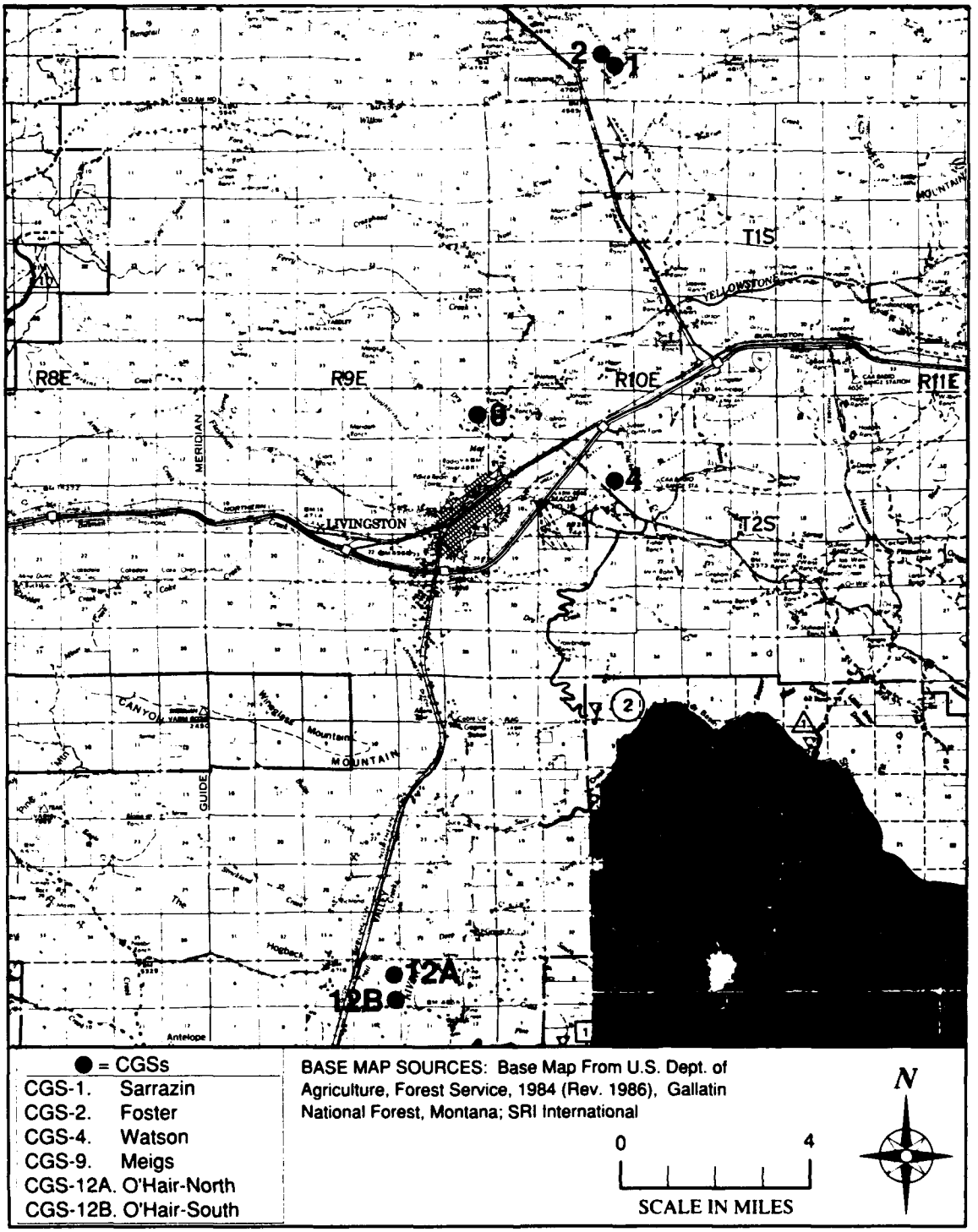

FIGURE 2.2 LOCATIONS OF SIX CANDIDATE GWEN SITES IN PARK COUNTY

Phase 2, regional screening, involved the application of exclusionary and evaluative criteria to the SSA to identify areas that might contain operationally acceptable sites outside environmentally sensitive areas. The resulting search areas, called potential areawide sites (PAWS), were submitted to appropriate federal, state, and local officials for review. The PAWS were then redefined, as appropriate, by incorporation of the comments of the reviewers, and a field investigation was conducted to find suitable candidate sites for a GWEN relay node within the redefined PAWS.

A field investigation for south central Montana was conducted in July 1989. Eighteen sites were identified during automobile-based surveys as potential candidate GWEN sites (PCGSs), some of which were located outside of the SSA due to the limited number of suitable candidate sites within the SSA boundaries. The sites identified outside of the SSA were evaluated under the same FEIS siting criteria as the sites within the SSA. All PCGSs were located in Park County. Attempts were made to contact the owners of the sites to determine their interest in selling or leasing land to the Government. Rights-of-entry were granted to investigate eleven PCGSs. Following evaluation against the environmental siting criteria set forth in the FEIS, six of the eleven PCGSs were recommended as CGSs for further review.

Subsequent to the PSER being issued and site-specific studies being accomplished, three CGS landowners withdrew four sites from consideration (Foster, CGS-2; O'Hair-North, CGS-12A; O'Hair-South, CGS-12B; and Watson, CGS-4). These landowners are no longer interested in leasing or selling their land to the Air Force. However, since many of the site-specific studies had been accomplished on these sites prior to the owners' withdrawal and because these sites continue to be considered as viable alternatives, the Air Force has presented this data on the withdrawn sites in this EA.

Phase 3, individual site evaluation, of which this EA is a part, is then used to determine the relative suitability of the candidate sites through site-specific technical studies. This EA presents the results of the environmental portions of those studies and covers site-specific impacts associated with construction of a relay node in south central Montana. These are summarized in Sections 4.2 through 4.7 of this EA. The findings of this EA

and site-specific studies of operational parameters will be used to select a preferred GWEN site (PGS).

2.1.2 Relay Node Construction and Operation

A typical relay node site is located on approximately 11 acres of land (see Figure 2.3 of this EA). It is an unmanned facility consisting of a 299-foot-tall, three-sided, 2-foot-wide LF transmitter tower, three equipment shelters, an access road, and associated fences. The tower has a base insulator and lightning protection and is supported by 24 guy wires, including 12 top-loading elements to further strengthen the signal and provide additional structural support.

These guy wires and top-loading elements are attached to the tower and 18 buried concrete anchors. The sizes of these anchors and their depth of burial varies with local soil and bedrock properties. However, the guy-wire anchors typically are rectangular blocks buried 5 feet below the surface. If bedrock occurs at or near the surface, the anchors are special rock-embedded rods. The tower base is concrete with a cross-section area resembling an inverted T. The size of this foundation is determined by soil conditions.

A radial ground plane, composed of 100 buried copper wires, extends out from the base of the tower. Each wire is 0.128 inch in diameter, about 330 feet long, and buried approximately 12 inches underground. The ground plane helps to strengthen the broadcast signal, and the number and length of the wires depend on the soil conductivity at the site. A 4-foot-high fence is installed around the perimeter of the ground plane to protect the ground plane and guy anchors and to prevent inadvertent exposure to electric shock resulting from the buildup of static electric charge.

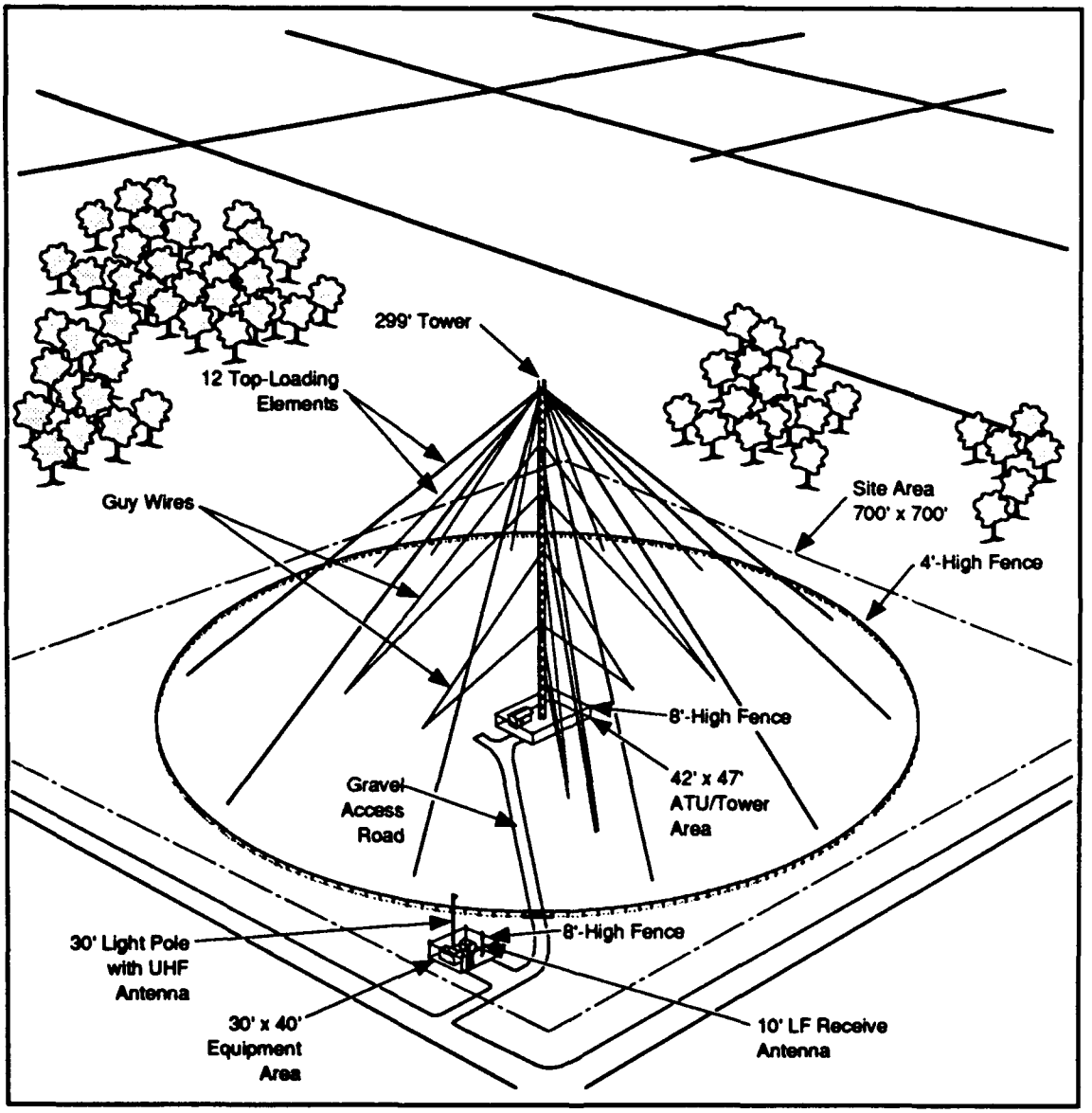

FIGURE 2.3 TYPICAL LAYOUT OF FOC RELAY NODE STATION

In addition to the main tower, the relay node has two other antennas. One is an LF receive antenna made up of a pair of 4-foot-diameter rings mounted on a 10-foot pole. The second is an ultrahigh-frequency (UHF) antenna used for communicating with airborne input/output terminals. It is a 9-foot-high whip-like antenna mounted on a 30-foot-high pole. Both antennas are located within the equipment area at the perimeter of the site, which is enclosed by an 8-foot-high fence.

The siting and design of the tower are coordinated with the Federal Aviation Administration (FAA) to ensure compliance with FAA standards and regulations. The tower is equipped with a white strobe light at the top, which emits 40 flashes per minute and is rated at 20,000 candelas for daytime and twilight use and 2,000 candelas for nighttime use. To minimize glare at ground level, the light is focused upward and horizontally outward.

GWEN operates intermittently in the LF radio band at 150 to 175 kilohertz (kHz). For comparison, the low end of the AM band for commercial broadcasts is 530 kHz. The peak broadcast power for each GWEN tower is from 2,000 to 3,000 watts, depending on local soil conditions. In its ready status, GWEN typically transmits for a total of 6 to 8 seconds per hour. GWEN does not interfere with commercial television, radio broadcasts, amateur radio operations, garage door openers, or pacemakers, as noted in Section 2.1.1.1, page 2-3 of the FEIS.

All equipment shelters are anchored to concrete pads. One shelter, located at the base of the tower, houses the antenna tuning unit (ATU). Two other shelters are located side by side in the equipment area enclosed at the perimeter of the property. One houses radio processing equipment, and the other houses a 70-horsepower, back-up diesel generator and two aboveground fuel tanks. The generator operates 2 hours per week for testing purposes and during power outages. Locked, 8-foot-high chain link fences topped with barbed wire secure the equipment shelter areas at the base of the tower and at the perimeter of the site to provide safety and to inhibit unauthorized entry. A 12-foot-wide gravel road provides access to the equipment area enclosure at the perimeter of the property. A 10-foot-wide gravel road leads from the enclosure to the tower.

Fuel is stored in two aboveground steel tanks inside the generator shelter. Tank capacities are 559 gallons and 461 gallons. Each tank pipes fuel separately to the back-up power group (BUPG) and is equipped with two outlet shut-off valves, one controlled manually and one controlled automatically. If a leak occurs, fuel will flow into a floor drain leading to a tightly capped pipe extending outside the BUPG. Once approximately 2 gallons of fuel accumulate in the pipe, a "liquid spill" signal is sent to the GWEN Maintenance Notification Center, which will dispatch maintenance personnel. However, if a leak were not detected, an explosion inside the shelter would be extremely unlikely due to the high flash point of diesel fuel. If a tank at the GWEN station failed, the entire contents of one tank could be released and contained inside the BUPG shelter. Refer to Section 4.12.1.1, beginning on page 4.12-1 of the FEIS for further discussion on diesel fuel spills and leaks.

The station uses existing commercial three-phase electric power and telephone service, but does not require water, septic, or sewer systems. Power and telephone service are brought to the site through either overhead or buried lines, depending on local utility practices. Power and telephone service are generally brought underground from the site boundary to the equipment shelter area.

Temporary increases in air pollutant emissions will occur during construction, primarily from greater use of heavy machinery than is required in normal farming operations. Emissions resulting from operations of the facility will be limited to the operation of the BUPG, which will operate only 2 hours every week for testing purposes and for additional periods as required during power outages. Thus, the generator will operate for a total of 152 hours per year, if commercial power outages totaled 48 hours. If the generator runs at 100 percent load during the projected 152-hour operating time, total emissions in one year will be less than 350 pounds per pollutant, as documented in Section 4.3.1, beginning on page 4.3-1 of the FEIS.

Noise levels generated by construction equipment are discussed in Section 4.5.1.1, beginning on page 4.5-1 of the FEIS. Under worst-case assumptions, levels could reach 78 dBA at the site boundary from on-site activity and 92 dBA at distances of 50 feet from

equipment installing the off-site access road. Noise generated during GWEN operation would come from the BUPG, which will operate only 2 hours per week and during commercial power outages. The BUPG will be located at least 50 feet within the site boundary with its exhaust side oriented toward the tower area. Noise levels due to intermittent operation of the BUPG will be less than 72 dBA at the site boundary, which is within the standards typically set for lands under agricultural use (70 to 75 dBA). At 50 feet beyond the site boundary, the noise level would drop below 65 dBA, which is within the standards typically set for residential and mixed residential/agricultural use (55 to 65 dBA). These noise levels and standards are discussed in Section 3.5.3, page 3.5-2 and Section 4.5.1, pages 4.5-1 through 4.5-6 of the FEIS.

Construction will require as many as 20 workers at any given time and take about 6 weeks. Standard earth-moving and erection equipment will be used, as detailed in Table 2-1, page 2-14 of the FEIS. Erosion control techniques that are consistent with local practices will be used during construction. Grading will be minimal at all sites except at the Foster site (CGS-2), which is discussed in Section 2.3 of this EA. Vegetation removal at any of the sites would be minimal. The site will be replanted after construction is finished.

After construction is completed, personnel requirements will be limited to periodic maintenance by a contractor who will service the equipment, cut the surface growth, remove snow from the access road, and perform other services as needed. Security services will be arranged with local authorities. The projected life of the facility is 15 to 25 years. Upon decommissioning, the tower and other structures will be removed, as discussed in Section 2.1.4, page 2-18 of the FEIS.

2.2 Alternative 1: Sarrazin Site (CGS-1)

The Sarrazin site is approximately 1.4 miles north of the SSA, 584 feet northeast of Shields River Road East in the western half of the northwest quarter (W1/2 NW1/4) of Section 33, Township 1N, Range 10E, Park County. The site is 1,500 feet north of the intersection of Shields River Road East and Falls Creek Road. Access would be from

Shields River Road East; 584 feet of existing road would be improved and graveled, and a culvert would be required. Grading would be minimal.

Three-phase power would be obtained from overhead lines 635 feet south of the site, on the south side of Shields River Road East. Telephone lines would be connected to an underground cable also 635 feet from the site and south of Shields River Road East.

Appendix B, Figure B.1 of this EA, provides a map showing the surrounding topography.

2.3 Alternative 2: Foster Site (CGS-2)

The Foster site is approximately 1.4 miles north of the SSA, 20 feet northeast of Shields River Road East in the NE1/4 of Section 32, Township 1N, Range 10E, Park County. The site is approximately 2,000 feet northeast of the intersection of Shields River Road East and Falls Creek Road, and approximately 1.4 miles north of U.S. Highway 89. Access would be from Shields River Road East; 20 feet of road and a culvert would be required. On-site grading would be required to fill or reconfigure some small (approximately 1-foot wide by 1-foot deep) ditches that cross portions of the site at roughly 100-foot intervals.

Three-phase power would be obtained from overhead lines adjacent to the southwestern edge of the property. Telephone lines would be connected to an underground cable south of Shields River Road East, about 50 feet from the site.

Appendix B, Figure B.2 of this EA, provides a map showing the surrounding topography.

2.4 Alternative 3: Watson Site (CGS-4)

The Watson site is 35 feet northeast of Boulder Road in the SW1/4 of Section 9, Township 2S, Range 10E, Park County. The site is approximately 1 mile east of U.S. Highway I-90. Access would be from Boulder Road, a gravel road; 35 feet of road and a culvert would be required. Grading would be minimal.

Three-phase power would be obtained from overhead lines along the south side of Boulder Road, approximately 75 feet south of the site. Telephone lines would be connected to an underground cable parallel to the power line, also about 75 feet south of the site on the south side of Boulder Road.

Appendix B, Figure B.3 of this EA, provides a map showing the surrounding topography.

2.5 Alternative 4: Meigs Site (CGS-9)

The Meigs site is approximately 3,600 feet northwest of old U.S. Highway 89 in the SE1/4 of Section 1, Township 2S, Range 9E, Park County. An unnamed dirt road crosses the southeast corner of the site. Access would be from the dirt road, 2,100 feet of which would be upgraded, beginning near the junction of Dry Creek and the Livingston Ditch, a major irrigation ditch that crosses the southeastern corner of Section 1. Grading would be minimal.

Three-phase power would be obtained from overhead lines about 160 feet southeast of the site boundary. Telephone lines would be connected to an underground cable approximately 2,100 feet to the southeast.

Appendix B, Figure B.4 of this EA, provides a map showing the surrounding topography.

2.6 Alternative 5: O'Hair-North Site (CGS-12A)

The O'Hair-North site is 315 feet south of an all-weather, unnamed ranch road in the NE1/4 of Section 3, Township 4S, Range 9E, Park County. The site is approximately 3,300 feet east of U.S. Highway 89, which intersects the ranch road. Access would be from the ranch road. The geometry of this road and the existing land uses necessitate a slightly longer route than the straight-line distances from either U.S. Highway 89 or the ranch road to the site, so that 315 feet of road would be newly constructed from the ranch road to the site, and 3,400 feet of the ranch road would require minor improvement. The site is flat, so grading would be minimal.

Three-phase power would be obtained from overhead lines 310 feet from the edge of the site. Telephone lines would be connected to an underground cable 3,300 feet from the site, along U.S. Highway 89.

Appendix B, Figure B.5 of this EA, provides a map showing the surrounding topography.

2.7 Alternative 6: O'Hair-South Site (CGS-12B)

The O'Hair-South site is approximately 0.5 mile south of the SSA, 12 feet north of Pine Creek Road in the SE1/4 of Section 3, Township 4S, Range 9E, Park County. The site is approximately 1 mile east of U.S. Highway 89 and 1,950 feet east of the intersection of Pine Creek Road and an unnamed road. Access would be from Pine Creek Road; 12 feet of road would be required across the highway easement. The site is flat, so grading would be minimal.

Three-phase power would be obtained from overhead lines about 45 feet south of the site on the southern side of Pine Creek Road. Telephone lines would be connected to an underground cable also about 45 feet south of the site, along the south side of Pine Creek Road.

Appendix B, Figure B.6 of this EA, provides a map showing the surrounding topography.

2.8 No Action Alternative

The no action alternative is deletion of the south central Montana relay node from the GWEN network. Adoption of this alternative would mean a consequent degradation in the performance of the system due to a lack of connectivity to other nodes in the system.

3.0 AFFECTED ENVIRONMENT

This section discusses the environmental setting of the proposed GWEN project in south central Montana. Section 3.1 of this EA describes the general characteristics of the SSA, and Sections 3.2 through 3.7 of this EA describe the unique characteristics of each CGS within the SSA. Site descriptive data was obtained during field investigations conducted in July 1989. U.S. Geological Survey 7.5 minute topographical maps were used as data sources for distances, physiographic features, and topography (USGS, 1951a-d, 1980, 1981a-f).

3.1 Site Search Area

Presented below is information on the physical, biological, and socio-cultural settings of the SSA.

3.1.1 Physical Setting

The SSA in south central Montana is a circular, 250-square-mile area in Park County, centered 0.6 mile southeast of the town of Livingston, in the Rocky Mountains physiographic province. It consists of portions of the valleys of the Yellowstone and Shields rivers and adjacent uplands. The SSA is bordered to the west by the Gallatin Range, to the south and east by the Absaroka Range, and to the north by the Crazy Mountains; and it is roughly bisected from south to north by the Yellowstone and Shields rivers. Yellowstone National Park is approximately 69 miles south of the SSA.

The geology of the region is complex, but the SSA itself contains a relatively simple pattern of east-west bands of rocks of mostly Carboniferous to Tertiary age, and small areas of Precambrian and Devonian age rocks. Rock age generally increases from north to south, with the oldest rocks occurring in the southeasternmost portions of the SSA. The rock types underlying the SSA are primarily sandstones, shales, and siltstones, although a band of limestones and dolomites occurs in the southern portion of the SSA. The mountains bordering the SSA have all been glaciated and are

composed of metamorphic rocks of Precambrian age and Tertiary age volcanics (Hunt, 1967; Taylor and Ashley, 1984).

The region containing the SSA is seismically active. Over 1,100 earthquakes have had epicenters within 80 miles of the SSA's center during historic times, and in 1939, three earthquakes with Modified Mercalli (MM) intensities up to IV occurred 6 miles southwest of the SSA's center. In 1974, an event of MM intensity III was centered 12 miles west of the center of the SSA, and in 1952, two earthquakes of MM intensity IV had epicenters 16 miles east of the center. These magnitude III and IV earthquakes were not strong enough to cause significant damage, although they were strong enough to be felt. However, seismic events strong enough to damage buildings have occurred farther from the SSA. An event of MM intensity VIII had its epicenter 60 miles northwest of the SSA. In 1959, an event of MM intensity X was centered 67 miles southwest of the SSA (Howard, *et al.*, 1979; Reagor, *et al.*, 1985; Stover, 1986). Earthquakes of these magnitudes are strong enough to cause substantial damage, including earth rupture, slope failure, severe cracking of masonry, the breaking of cement and asphalt pavement, and the destruction of well-built wooden bridges (Manitakos, 1989).

The SSA could be subject to severe groundshaking during a major earthquake. Secondary seismic hazards consist of ground lurching, slumping of stream banks, landslides, liquefaction, and ground settlement. These hazards occur in areas underlain by weak geologic materials, such as swamp muck and loose river deposits. For that reason, areas of shallow groundwater or potentially unstable slopes (e.g., stream banks, terrace scarps) were avoided during facility siting, thereby substantially reducing seismic hazards to a GWEN facility (Manitakos, 1989).

Economically recoverable minerals are limited to gravel and building materials (limestone and sandstone), although substantial mining districts lie to the west of the SSA, and gold is mined south of the SSA near Gardiner. Subbituminous deposits of uncertain quality occur in the SSA and exploration for oil and gas has been conducted. However, no exploitable deposits have been found to date (Langley, 1989; USGS, 1970).

There are no paleontological resources known in the SSA, with the exception of a Jurassic saurapod site in the mountains southwest of Livingston (Leggi, 1989).

The soils in the Shields and Yellowstone river valleys are derived from alluvium and weathered sedimentary rocks. The soils are in the Beaverell-Attewan and Cabba-Regent-Tolman complexes, and the Tridell gravelly loam, Tamaneen clay loam, Harlem clay loam series; these soils are neutral to strongly alkaline, with pH values ranging from 6.6 to 9.0, depending upon the soil type and depth. The soils on the CGSs vary in depth from 20 to 60 inches or more. Surface runoff from these soils is slow to medium, and the water erosion hazard is slight; potential for wind erosion is moderate (SCS, 1989). Depth to the seasonally high water table is greater than 5 feet from the surface at all sites. Although soils at the Meigs site (CGS-9) are generally characterized as having a water table within 2 to 3 feet of the surface (Smith, 1990a), field investigations established that the water table was greater than 5 feet, as discussed in Section 3.5 of this EA. None of the soils on the CGSs is prime farmland (Smith, 1990b) and none is hydric (SCS, 1987). The specific soils on each CGS are discussed in Sections 3.2 to 3.7 of this EA.

The Yellowstone and Shields rivers are the major watercourses in the SSA and they are both shallow, cold-water streams. Lakes and ponds are rare in the SSA, and those that are present are in the portion of the Yellowstone River Valley south of Livingston known as Paradise Valley. Major flows of surface waters are during the late spring and early summer snowmelts (USGS, 1970). Discharge values, in cubic feet per second, average 3,730 for the Yellowstone near Livingston, and 289 for the Shields River. Maximum daily rates are 15,300 and 1,780, respectively, for the Yellowstone and Shields rivers. Minimum daily rates are 540 and 36 for the Yellowstone and Shields rivers, respectively (USGS, 1990b). The surface waters closest to any CGS are an intermittent stream, Dry Creek, approximately 85 feet from the Meigs site (CGS-9), and an irrigation canal 112 feet from the Sarrazin site (CGS-1) (USGS, 1981d). None of the CGSs is in a 100-year floodplain (FIA, 1978). The distances from each CGS to the nearest surface water or wetlands are given in Sections 3.2 through 3.7 of this EA.

Surface waters in the SSA are of high quality, with low suspended sediment concentrations, but relatively high (>120 parts per million [ppm]) dissolved solids concentrations, mainly calcium magnesium bicarbonate (USGS, 1970). During the October 1988 to November 1989 water year, dissolved oxygen in the Yellowstone River ranged from 8.8 to 12.1 ppm and pH ranged from 7.7 to 8.2. Dissolved solids concentrations ranged from 75 to 37 ppm, and suspended sediment concentrations ranged from 6 to 125 ppm. Copper concentrations varied from 2 to 6 parts per billion (ppb) (USGS, 1990a). Groundwater supplies are essentially confined to the valley floors.

The climate is markedly seasonal with strong diurnal variations. The mean minimum temperatures exhibit pronounced north-to-south gradients in the SSA, but the mean maximum temperatures are uniform. Mean minimum temperatures in January range from 8°F in the south to 32°F in the north and mean minimums in July range from 48°F in the south to 54°F in the north. Mean maximum temperatures in July are 80°F in both the south and the north, but are 84°F in Livingston. Mean annual precipitation varies from 20 inches in the south to 14 inches in the north (Ruffner and Bair, 1978). Two-thirds of the annual precipitation occurs during the May-to-September frost-free (growing) season, and two-thirds of the remainder, or less than one-third of the total, falls as snow. Summer precipitation occurs primarily during the brief, intense rains of thunderstorms. Hail is relatively common, falling 4 to 5 days per year, mainly in July and August (Visher, 1954).

Air quality in Livingston and all of Park County is in attainment of the ambient air quality standards that have been set by the State of Montana (Montana Administrative Code 16.8.806). Livingston contains a municipal incinerator and a fairly new wood mill, but wind through the town is sufficient to maintain good air quality. The nearest Class I area is in Yellowstone National Park, approximately 69 miles south of the SSA (Norton, 1990). Air quality standards are discussed in Section 3.3.3, pages 3.3-1 to 3.3-7 of the FEIS.

3.1.2 Biological Setting

The vegetation of the SSA is a topographically zoned mixture of riparian woodlands, grasslands, and conifer forests that is broadly distributed in the northern Rocky Mountains. The riparian zones of the major streams are forested with cottonwood, willow, and ash, except where the land has been cleared for agriculture. The level to gently rolling uplands of the foothills are covered with grass and grass-sagebrush mixtures dominated by fescue, wheatgrass, needle-and-thread grass, and sagebrush. The steeper slopes, primarily those bordering Paradise Valley, are covered with Douglas fir forests.

The SSA has a diverse fauna of small mammals and birds, but its fisheries and big game populations are its exceptional features. The state hunting districts have sufficiently large and diverse populations of big game to support hunting seasons for pronghorn antelope, mule deer, whitetail deer, elk, moose, bighorn sheep, mountain goat, black bear and mountain lion (MDFWP, 1989a). However, only antelope, deer, and possibly wintering elk are to be expected on any of the CGSs because the habitat at the sites would not support the above-mentioned species.

Rainbow and brown trout are common in the river segments in the SSA, along with some Yellowstone cutthroat trout and brook trout. Trout yields in those portions of the Yellowstone River within the SSA are 237 pounds per 1,000 feet of stream. Trout populations in the Shields River are less diverse and abundant; only brown trout are common and yields are only 65 pounds per 1,000 feet of stream. Populations of less desirable, warmer water fish, such as suckers, dace, and whitefish, are higher in the Shields River (MDFWP, 1989b).

Bird populations in the SSA are dominated by grassland- and conifer-forest-dwelling species. However, the wetlands along the Yellowstone and Shields rivers provide nesting, rearing, resting, and moulting habitat for an estimated 77 species of ducks, geese, swans, cranes, and shorebirds. Additionally, a heron rookery is present in the northern portion of Paradise Valley between Sons and Pine creeks (Kratville, 1989). As many as 14 species of hawks, falcons, and eagles and nine species of owls occur in the

Gallatin National Forest and at least a large fraction of these can be expected in the SSA (USFS, undated). Common passerines include the chestnut-collared longspur, horned lark, western meadowlark, and various sparrows, blackbirds, vireos, warblers, and wrens (Jones, 1990).

The *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (GPO 1989-236-985/00336) states that an area must meet three criteria to be designated as wetland: hydric soils; hydrophytic vegetation; and wetlands hydrology, which includes a shallow water table and standing water for at least 7 days of the growing season (FICWD, 1989). This manual was used as the basis for wetland determination. Based on field investigations (Holt, 1989) and soils data (SCS, 1987; SCS, 1989; Smith, 1990a-b), none of the CGSs examined as part of this EA meets these three criteria, nor do the areas within 300 feet of the CGSs.

In compliance with Section 7 of the Endangered Species Act of 1973, as amended (16 United States Code [USC] 1531, *et seq.*, at 1536), a list of threatened and endangered species was obtained during informal consultation with the U.S. Fish and Wildlife Service (USFWS). The bald eagle (*Haliaeetus leucocephalus*) is the only species in the SSA that is threatened or endangered (Appendix C, McMaster, 1989, pages C-3 and C-4 of this EA; Appendix C, Harms, 1992, 1993, pages C-14 and C-15 of this EA). However, the USFWS field staff also cited the black-footed ferret (*Mustela nigripes*), an endangered species, as a species to be looked for if prairie dog towns, its habitat, were present. Also, a former eyrie of the peregrine falcon (*Falco peregrinus anatum*) was said to be present in the cliffs above the Yellowstone River south of Livingston (Taylor, 1989). The Montana Natural Heritage Program lists the Yellowstone cutthroat trout (*Salmo clarki bouvieri*) as a sensitive species and Thurber's needlegrass (*Stipa thurberiana*) as a plant species of uncertain status within Montana but of secure status globally (MNHP, 1989).

The bald eagle is primarily associated with riparian areas such as coasts, rivers, and lakes, and usually nests and feeds near large bodies of water. Although the bald eagle is an opportunistic feeder and will take a variety of vertebrate prey, fish comprise the major part of its diet. The bald eagle migrates along the Shields River (Appendix C,

McMaster, 1989, pages C-3 and C-4 of this EA). The peregrine falcon, a predator of other birds, nests on cliffs, and forages in wetlands and open areas such as cropland and grassland. Peregrine falcons could be expected to occur throughout the portions of the Yellowstone River Valley south of Livingston if they were to become reestablished in the SSA. The black-footed ferret is a large, weasel-like mammal that feeds on white- and black-tailed prairie dogs (*Cynomoys species*), and so is generally found near prairie dog towns. The Yellowstone cutthroat trout requires cool streams of high-quality waters. Thurber's needlegrass is generally found in dry grassland and in heavy soil. The SSA's only known sample of this needlegrass was collected in 1943 in the general vicinity of the county airport, about 0.5 mile from the Watson site (CGS-4). No sensitive plant or animal species are known to reside on or next to any CGS (MNHP, 1989).

The Absaroka-Beartooth Wilderness Area extends about 6 miles into the southeastern part of the SSA, but is approximately 4 miles east of the nearest CGSs, the O'Hair-North (CGS-12A) and O'Hair-South (CGS-12B) sites.

3.1.3 Socio-Cultural Setting

Human occupancy of the area began at least 10,000 years ago, as evidenced by a Clovis burial site about 10 miles northwest of the SSA near Clyde Park. Immediately prior to European settlement of the area in the 1800s, the SSA was occupied by the Crow tribe (Brownell and Karsmizki, 1990).

In 1806, William Clark passed through the Bozeman Pass and reached the Yellowstone River not far from present day Livingston. The immense wealth of furs reported by Lewis and Clark stimulated the development of the Upper Missouri fur trade. In 1808, Manuel Lisa set up the first fur trading post at what was then a few days' journey to the east of the SSA, at the juncture of the Bighorn and Yellowstone rivers. Trappers traveled and trapped the Upper Yellowstone area during the early 1800s, despite conflicts with the Crow Indians (Brownell and Karsmizki, 1990).

The discovery of gold in 1862 in several areas near Yellowstone led to the development of travel routes to the mines. Miners often used the Yellowstone River as their mode of

transportation, travelling in mackinaws or flatboats built near Emigrant Gulch, about 21 miles south of present-day Livingston. A wagon route known as the Road to Tongue River followed the Yellowstone along its north bank and over Bozeman Pass into the Gallatin Valley. With the expanded traffic through the Yellowstone Valley, conflicts with Native Americans increased. In 1867, the Montana Militia was created for the protection of settlers in the Upper Yellowstone and the Gallatin Valley. Fort Ellis was established east of Bozeman in 1867 and was responsible for patrolling the Shields and Upper Yellowstone area. The treaty of 1868 removed from Crow Territory all land north of the Yellowstone River. The first Crow Agency was established in 1869 on the Yellowstone at the mouth of Mission Creek, about 7 miles northeast of Livingston. The Crow Agency was moved to Rosebud Creek in 1875 (Brownell and Karsmizki, 1990).

After the Crow were forced onto reservations, settlers from the east came to Park County to claim land and to work on the railroad. Livingston was founded by the Northern Pacific Railroad in 1882 as the site of a railroad store and quickly absorbed a small existing community; by the 1890s Livingston was a thriving rail center (Anonymous, 1989). After the completion of the Northern Pacific Railroad's Yellowstone branch in 1883, Livingston became the entrance to Yellowstone National Park (Brownell and Karsmizki, 1990).

By 1900, the population in Park County was over 7,000, and the area was described as 60 percent agricultural and grazing lands and 40 percent mountainous; the major industries were mining, agriculture, and stock raising. Most lands in Park County north of the Yellowstone were open range for both cattle and sheep. The first cattle had been driven into Montana from Texas in 1866 by Nelson Story, who had a cattle camp near the present day site of Livingston. Approximately 30 miles east of Livingston, Big Timber became one of the major wool shipping points in the territory and by the year 1900, Montana led the nation in wool production (Brownell and Karsmizki, 1990).

The topographic setting of the SSA places it in a significant east-west corridor that was important in historic times and in a north-south corridor that was important in prehistoric times. Paleo-Indian sites exist in this part of Montana, and Montana state records list six

previously recorded archaeological sites, of varying ages, in or adjacent to sections containing the CGSs.

The Montana State Historic Preservation Officer (SHPO) was consulted as required by the National Historic Preservation Act (16 USC 470, *et seq.*). The Montana SHPO determined that all sites have high cultural resource site potential and recommended that an intensive cultural resource survey be conducted (Appendix C, Schwab, 1989, page C-6 of this EA). The cultural resources survey work consisted of a Phase I archaeological survey and an inventory of standing historic properties.

In January 1990, a Phase I archaeological survey was conducted on five of the six CGSs; the Foster site (CGS-2) was withdrawn prior to the on-site survey. A professional archaeologist qualified in the State of Montana conducted an on-site archaeological survey using 20-meter-wide zigzag transects. No significant cultural remains were found on any of the sites surveyed. An isolated nonsignificant find was recorded in the center of the O'Hair-North site (CGS-12A). During the on-site survey, no visible signs or extension or association of the six previously recorded archaeological sites were noted (Bergstrom, 1990). The Montana SHPO also indicated that portions of the Yellowstone River Valley south of Livingston have been proposed as worthy of designation as an archaeological district, although lack of funds has prevented the substantial fieldwork needed to prepare a formal nomination for listing on the National Register of Historic Places (NRHP). The two closest known areas of archaeological finds in the Yellowstone River Valley are 1 and 5 miles, respectively, from the nearest CGS, the O'Hair-South site (CGS-12B) (Schwab, 1989).

The inventory of standing historic properties was conducted in June 1990, covering an area within 1.5 miles of any CGS. This radius was chosen because significant historic structures that occur within 1.5 miles of a CGS are potentially subject to adverse visual impacts from the relay node facility, as discussed in Section 4.8.1.3, beginning on page 4.8-2 of the FEIS and Section 4.1.3 of this EA. This inventory was conducted on the Sarrazin (CGS-1), Watson (CGS-4), and Meigs (CGS-9) sites; the other three CGSs had previously been withdrawn by the landowners. The inventory consisted of a literature

search, a reconnaissance survey, and an evaluation of the historic properties to determine eligibility for the NRHP (Brownell and Karsmizki, 1990).

The literature search revealed one listed property, three eligible properties, and one potentially eligible rural historic landscape. The one listed property (actually a group of properties) is the Livingston Historic District, which is more than 1.5 miles from the nearest CGS. The three eligible properties, which are within 1.5 miles of a CGS, are radio station KPRK, the Shields River branch of the Northern Pacific Railroad, and the Livingston Ditch. Setting is not considered important to any of these eligible properties (Brownell and Karsmizki, 1990), so they would not be subject to visual impact from a GWEN tower.

The reconnaissance survey identified two farmlands within 1.5 miles of a CGS as having buildings considered eligible for the NRHP. These buildings are considered eligible because of their architectural value, so setting is not considered important to their eligibility. The survey also identified the Shields River Valley as potentially eligible for listing as a rural historic landscape, as defined by the National Register, Bulletin 30 (NPS, undated). This rural historic landscape contains two of the CGSs (CGS-1 and CGS-2), and setting is considered important to its eligibility (Brownell and Karsmizski, 1990). The Montana SHPO concurs that this district is potentially eligible for listing on the NRHP, but additional research and evaluation would be required before any formal nomination could be made to the NRHP (Appendix C, Huppe, 1990, pages C-8 through C-10 of this EA). Details of these historic properties and the rural historic landscape are discussed in Sections 3.2 through 3.7 of this EA.

In compliance with the American Indian Religious Freedom Act of 1978 (42 USC 1996), the Bureau of Indian Affairs (BIA) was consulted in order to locate tribes associated with the project area (Hall, 1992). According to the BIA, the Crow tribe is the only federally recognized tribe living in the project area. At BIA recommendation, the Crow Cultural and Historical Commission was notified, the GWEN project was explained, and information was requested regarding traditional, religious, or sacred sites located within the SSA. A representative of the Commission responded that the tribe has no concerns with the GWEN project (Old Coyote, 1990).

Land use in the area is predominantly agricultural. Settlement in the Shields and Yellowstone river valleys is rural; multi-square-mile ranches are typical. Urban settlements are small, and Livingston is the only town in the SSA, although there is a small housing cluster at Pine Creek. The CGSs are all within agriculturally zoned portions of Park County. There are no building codes applicable to the proposed GWEN facility (Lang, 1989).

Sources of ambient noise are limited primarily to the operation of farm equipment and traffic. As described in Section 3.5.3, beginning on page 3.5-1 of the FEIS, local ordinances typically set maximum noise level limits at 70 to 75 dBA for land under agricultural use; however, Park County does not have a local noise ordinance (Lang, 1990).

Park County has a population of 12,660, the majority of which resides in Livingston (6,994). The median age is 32.6; 75 percent are high school graduates (Census Bureau, 1983). The population of Park County increased 6.5 percent between 1980 and 1984 (Rand McNally, 1990). The economy of the county is based on tourism and a blend of agricultural and transportation activities, with roughly equivalent portions of the population employed in railroad (1,040), retail sales (1,025), and services (1,381); the remaining 2,200 employed persons are involved primarily in agriculture, sales, or manufacturing (Census Bureau, 1983). Per capita income in 1984 was $10,539 (Census Bureau, 1988). However, unemployment is high, with 8.8 percent of a 6,594 person labor force idle in 1986 (Census Bureau, 1988).

U.S. Highway I-90 is the principal east-west route through the SSA. U.S. Highway 89 runs north-south in the southern part of the SSA, then runs east-west through the center of the SSA and the town of Livingston, then turns north again. U.S. Highway 89 is the only highway leading to the north gate of Yellowstone National Park, 69 miles south of the SSA. Pine Creek Road is the principal route leading from U.S. Highway 89 to the unincorporated community of Pine Creek. Pine Creek Road is also a public access route to the Gallatin National Forest and Yellowstone River. The county airport is in the northeast portion of the SSA, 2.6 miles from the nearest CGS.

The primary recreational activities in the area are fishing, hiking, camping, and hunting. Yellowstone National Park is approximately 69 miles south of the SSA. The trout fisheries of the Yellowstone River have a national reputation and are a significant component of the area's recreation appeal. Big-game hunting can be pursued in the Gallatin National Forest (USFS, 1987). The Montana Department of Fish, Wildlife, and Parks establishes seasons, issues licenses and permits, sets limits, and enforces regulations.

The visual setting of the SSA is natural in character, with varied topography, from valleys to benchlands, foothills, and mountains. The southern half of the SSA is mountainous, except for the 4- to 6-mile-wide valley of the Yellowstone River. The northern half consists of lower, rounded mountains and foothills and an elevated plateau along the southeastern side of the Yellowstone north of Livingston. Typically, the terrain in this half of the SSA is gently rolling to hilly, except in the Yellowstone and Shields river valleys and the plateau southeast of the Yellowstone. Due to the mountains virtually surrounding the area, the complexity of the skyline is generally high, as defined in Section 4.8.1.3, page 4.8-10 of the FEIS.

3.2 Alternative 1: Sarrazin Site (CGS-1)

The Sarrazin site is a relatively flat, nonirrigated tract on the uplands of the Shields River Valley, above the floodplain of the Shields River, northeast of Shields River Road East. The soil is Tamaneen clay loam, a neutral to mildly alkaline soil with pH values ranging from 6.6 to 7.4 (SCS, 1989). Depth to the seasonally high water table is greater than 5 feet (Smith, 1990a). Vegetation on the site is shortgrass prairie with abundant admixtures of sagebrush and prickly pear cactus.

An irrigation canal at the edge of the floodplain, the Palmer Ditch, is 875 feet to the west and 40 to 60 feet below the site. A second canal that follows the topographic contours of the uplands, the Lower Shields Valley Ditch, is 112 feet north of the site.

Three properties considered eligible for the NRHP are located within 1.5 miles of this CGS; the CGS sits in the Shields River Valley, which is potentially eligible for listing as a rural historic landscape. Two of the three NRHP-eligible properties are historic structures: a log house (24PA894), 0.6 mile north, and a Gothic-roofed barn (24PA892), 0.4 mile south of the site. The third property is the Shields River branch of the Northern Pacific Railroad, 0.6 mile to the west (Figure 3.1 of this EA). None of these properties involves setting as an important criterion for listing on the NRHP. The two buildings are considered eligible because of their architectural value and the rail line is a linear site with no associated buildings. Setting is considered important to the rural historic landscape (Brownell and Karsmizki, 1990).

The Shields River is approximately 0.3 mile to the south. U.S. Highway 89 is 0.7 mile to the west, and the nearest residential community is the town of Livingston, 8.5 miles to the southwest.

3.3 Alternative 2: Foster Site (CGS-2)

The Foster site is a flat, level tract of irrigated grassland in the Shields River Valley immediately northeast of Shields River Road East. The site is just north of the escarpment separating the uplands from the floodplain. The soil is Tamaneen clay loam, neutral to mildly alkaline soil with pH values ranging from 6.6 to 7.4 (SCS, 1989). Depth to the seasonally high water table is greater than 5 feet (Smith, 1990a). The tract is bordered to the northwest and the southeast by ravines that are 15 to 20 feet deep and up to 100 feet wide. Vegetation in the bottom of these ravines is composed of willows, cottonwoods, and lush stands of tall, coarse-leaved grasses and thistles.

Shallow water distribution ditches, about 1-foot square in cross-section, traverse the CGS at 100-foot intervals. The Lower Shields Valley Ditch, an irrigation canal, is 1,500 feet northeast of the CGS; the Palmer Ditch begins about 500 feet southwest of the CGS.

This CGS was withdrawn before archaeological and historic property surveys could be completed. However, the CGS is within 1.5 miles of the same three NRHP-eligible properties as the Sarrazin site (CGS-1): the log house, the Gothic-roofed barn, and the

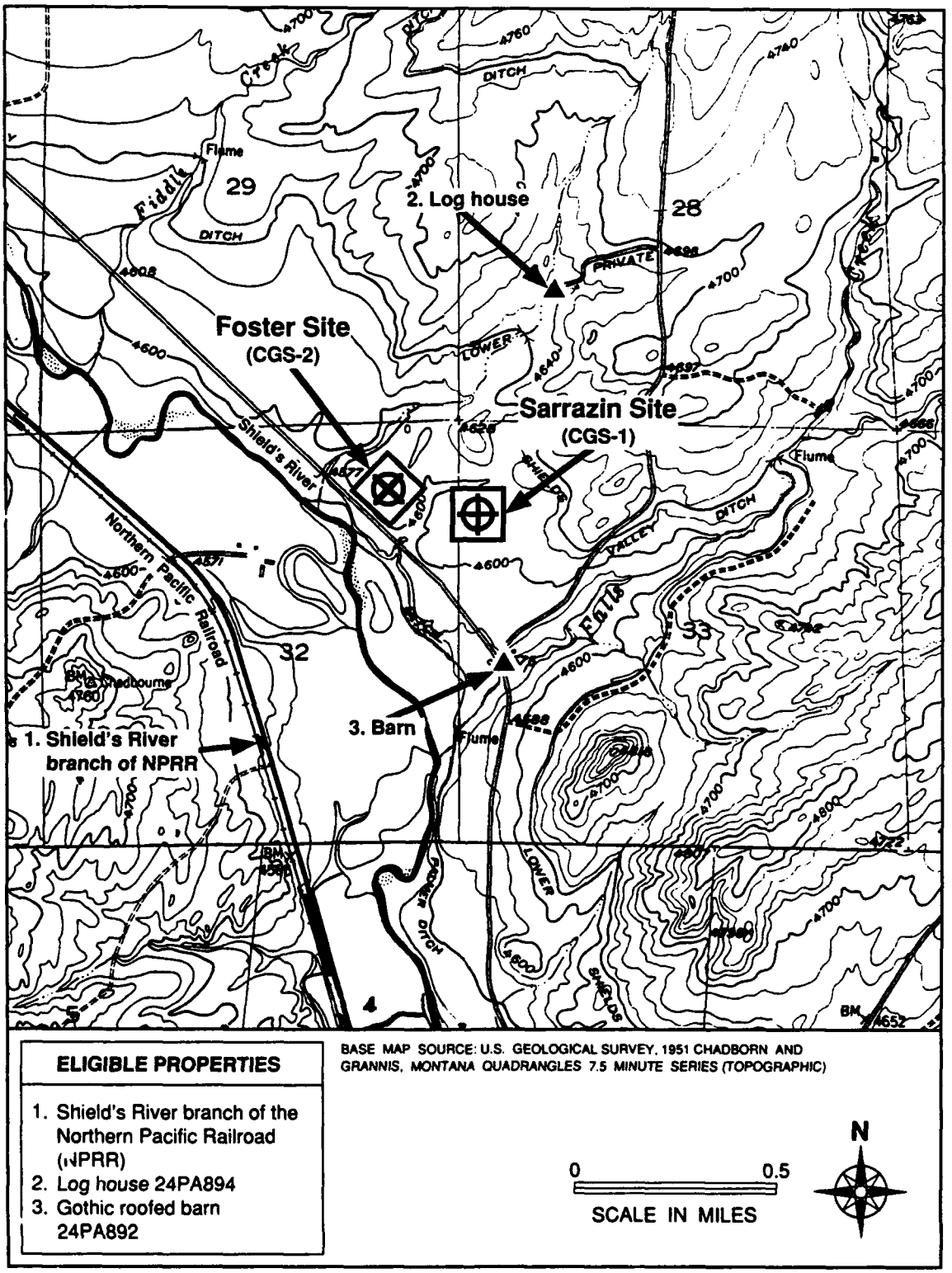

FIGURE 3.1 LOCATIONS OF PROPERTIES THAT ARE LISTED, ELIGIBLE, OR POTENTIALLY ELIGIBLE FOR LISTING ON THE NATIONAL REGISTER OF HISTORIC PLACES WITHIN 1.5 MILES OF THE SARRAZIN (CGS-1) AND FOSTER (CGS-2) SITES

Shields River branch of the Northern Pacific Railroad, none of which involves setting as an important criterion for NRHP eligibility (Figure 3.1 of this EA). In addition, the site lies within the Shields River Valley, which is potentially eligible for listing on the NRHP as a rural historic landscape and setting is important to its eligibility (Brownell and Karsmizki, 1990).

U.S. Highway 89 is approximately 1.4 miles to the west. The nearest residential community is the town of Livingston, approximately 8.5 miles to the southwest.

3.4 Alternative 3: Watson Site (CGS-4)

The Watson site is a flat, virtually level parcel of nonirrigated shortgrass prairie on the high terraced uplands east of the Yellowstone River Valley. The soil is Tridell gravelly loam, a neutral to moderately alkaline soil with pH values ranging from 6.6 to 8.4 (SCS, 1989). Depth to the seasonally high water table is greater than 5 feet (Smith, 1990a). Vegetation on the site consists of a sparse cover of grasses less than 6 inches high, small sagebrush plants, and an assortment of prickly pear and forbs.

No historic properties, listed, eligible, or potentially eligible for listing on the NRHP were identified during the historic structures survey (Brownell and Karsmizki, 1990).

U.S. Highway I-90 is 0.9 mile northwest of the site at its closest approach. The nearest residential community is the town of Livingston, 2 miles west of the CGS.

3.5 Alternative 4: Meigs Site (CGS-9)

The Meigs site is a planar, gently sloping, nonirrigated parcel in a somewhat bowl-shaped indentation in the range of low hills bordering the western edge of the Yellowstone River Valley. The site is a cultivated field that was planted with oats in 1989. The soil is Harlem clay loam, mildly to strongly alkaline, with pH values ranging from 7.4 to 9 (SCS, 1989). Depth to the seasonally high water table for this soil type is normally between 2 and 3 feet, and in low-lying areas this soil type is subject to rare flooding (Smith, 1990a; SCS, 1989). However, at this site the presence of native upland

vegetation (shortgrass prairie) in the bottom of an intermittent stream, Dry Creek, indicates that the depth of the water table is well below the surface of the streambed, which is itself 5 feet below the surface of the CGS (Holt, 1989). The watercourse is within 85 feet of the southwest corner of the site.

Two properties considered eligible for the NRHP are located within 1.5 miles of the Meigs site: radio station KPRK, 1.4 miles to the southeast, and the Livingston Ditch, 0.2 mile to the southeast (Figure 3.2 of this EA). Neither of these properties involves setting as an important criterion for NRHP eligibility. The radio station is a locally unique example of the "moderne" style of architecture, and the ditch is a linear site with no associated structures. The radio station is not yet 50 years old, but it will be listed when that age is reached (Brownell and Karsmizki, 1990).

U.S. Highway I-90 is 2.2 miles to the southeast. The nearest residential community is the town of Livingston, approximately 1.1 miles to the south.

3.6 Alternative 5: O'Hair-North Site (CGS-12A)

The O'Hair-North site is a mostly flat, nonirrigated parcel in the Yellowstone River Valley south of Livingston. It is on an old river terrace that is about 10 feet higher than the adjacent, equally flat land that now borders the Yellowstone River. The soils are in the Beaverell-Attewan complex; these soils are neutral to moderately alkaline, with pH values ranging from 6.6 to 8.4 (SCS, 1989). Depth to the seasonally high water table is greater than 5 feet (Smith, 1990a). Vegetation on the site is short, grassy prairie.

An isolated find was uncovered during the archaeological survey, but this find is not significant (Bergstrom, 1990). The Montana SHPO also indicated that this general area south of Livingston has been proposed as worthy of designation as an archaeological district. However, formal nomination to the NRHP has not been undertaken (Schwab, 1990). This site was withdrawn before the historic structures survey was conducted, so the potential for historic structures is unknown.

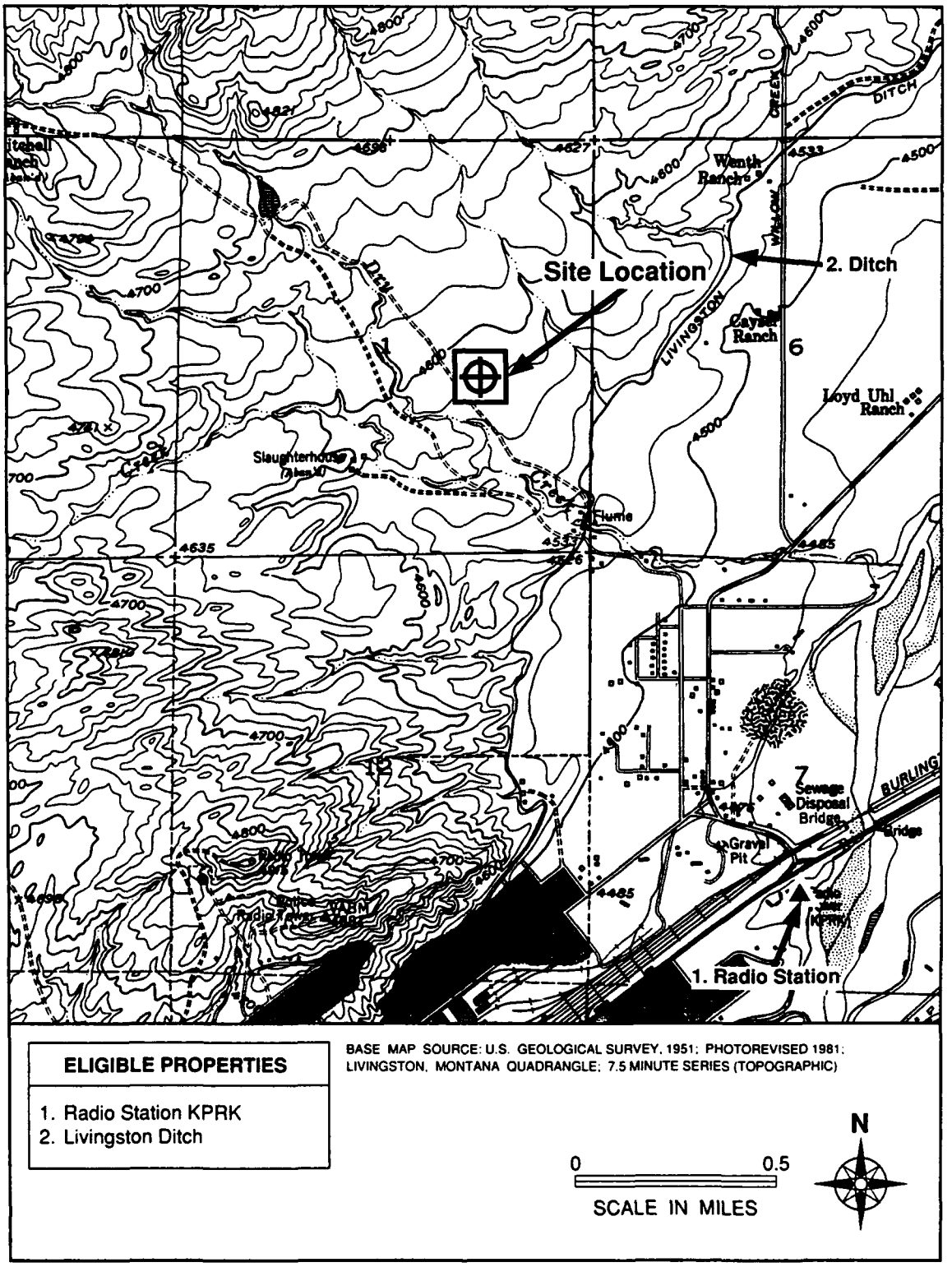

FIGURE 3.2 LOCATIONS OF PROPERTIES THAT ARE ELIGIBLE FOR LISTING ON THE NATIONAL REGISTER OF HISTORIC PLACES WITHIN 1.5 MILES OF THE MEIGS SITE (CGS-9)

The Yellowstone River is 0.6 mile to the east; the nearest lake is 1 mile to the north. U.S. Highway 89 is 0.7 mile to the west. Pine Creek Road, which provides primary access to a trout fishing access station on the Yellowstone River at Pine Creek Bridge, is approximately 1 mile from the site. The nearest residential community is the town of Livingston, approximately 8.6 miles to the north.

3.7 Alternative 6: O'Hair-South Site (CGS-12B)

The O'Hair-South site is a flat, nonirrigated parcel in the Yellowstone River Valley south of Livingston. It is on a level portion of an old river terrace that is about 10 feet higher than the adjacent, equally flat land bordering the Yellowstone River. The soils are Beaverell-Attewan complex; these soils are neutral to moderately alkaline, with pH values ranging from 6.6 to 8.4. Depth to the seasonally high water table is greater than 5 feet (Smith, 1990a). Vegetation on the site is short, grassy prairie.

No significant archaeological resources were found (Bergstrom, 1990). The Montana SHPO also indicated that this general area south of Livingston has been proposed as worthy of designation as an archaeological district. However, formal nomination to the NRHP has not been undertaken. This site was withdrawn before the historic structures survey was conducted, so the potential for historic structures is unknown.

U.S. Highway 89 is approximately 1 mile to the west. The site is next to Pine Creek Road, which is the principal route leading from U.S. Highway 89 to the unincorporated community of Pine Creek and is also a public access route to a trout fishing access station on the Yellowstone River at Pine Creek Bridge. The Yellowstone River is 0.4 mile to the east. The nearest lake is 2 miles to the north. The nearest residential community is the town of Livingston, approximately 9.2 miles to the north.

4.0 ENVIRONMENTAL CONSEQUENCES OF ACTION ALTERNATIVES

This section discusses the potential impacts of the GWEN project on the environmental setting of the six CGSs in south central Montana. Several impacts common to some or all of the action alternatives are discussed in Section 4.1 of this EA. Impacts that are unique to each action alternative are discussed in Sections 4.2 through 4.7 of this EA. As indicated in Sections 4.2 and 4.7 of this EA, the project would have significant impacts on historic properties if built on the Sarrazin site (CGS-1) and significant visual impacts if built on the O'Hair-South site (CGS-12B). Complete impacts are unknown on the Foster (CGS-2), O'Hair-North (CGS-12A), and O'Hair-South (CGS-12B) sites because they were withdrawn before cultural resources surveys were completed, as discussed in Sections 4.3 and 4.6 of this EA. There would be no impacts on the Watson (CGS-4) or Meigs (CGS-9) sites, as discussed in Sections 4.4 and 4.5 of this EA.

4.1 Common Features

Presented below is information on the physical, biological, and socio-cultural impacts common to some or all of the action alternatives.

4.1.1 Physical

Impacts from **construction** activities would not be significant. Construction would require localized earth-moving, including excavation and backfilling for placement of foundations and guy-wire anchors. Less than 3,800 square feet would be covered with concrete and gravel for the tower base and the equipment area enclosures. Similar coverage would be required for on-site access roads and parking; incidental activities during construction would disturb a similar amount. In total, about 0.25 acre would be occupied by foundations and the on-site access roads. Construction of the off-site access road and installation of utility lines would have no significant impacts because they would cover no more than 2 acres of land along the previously graded public highway right-of-way.

The ground plane would be installed using machines that bury wire approximately 1 foot below the surface with minimal disturbance of the soil surface. This process would require moving a small tractor or similar equipment over much of the 11-acre site, but would not significantly disturb the existing vegetation or create a significant erosion hazard.

Impacts to **mineral resources** would be minor, as indicated in Section 4.1.1.4, page 4.1-2 of the FEIS. Economically recoverable minerals are limited to gravel and building materials such as limestone and sandstone (Langley, 1989; USGS, 1970). If any resources are present under a site, access to them is unlikely to be restricted, due to the small size of the GWEN site. If access were restricted, development of the site would only deny access to a small portion of those resources for the lifetime of the project and would not result in any significant impacts.

Significant impacts on **paleontological resources** are not anticipated because fossils are not known to occur in the lowlands of the SSA (Leggi, 1989). However, if any fossils are found during construction, work that might affect them would be suspended while the Montana State Geologist is notified and the significance of the find is evaluated.

Erosion and increase in storm water runoff would not be significant. All sites have slopes of less than 8 percent, so any required grading to level the site would be minimal. In addition, standard measures for erosion control would be used during and after site construction, including replanting the site.

None of the CGSs is in a **100-year floodplain** (FIA, 1978).

No **prime farmland** would be removed from production for the duration of the project because none of the sites contains designated prime farmland (Smith, 1990b).

No significant impacts on **drinking water** are expected, as discussed in Sections 3.2.4.1 and 4.2.1.1, pages 3.2-2 and 4.2-3 of the FEIS. Corrosion of the ground plane is not anticipated to raise copper concentrations in any aquifer or surface water body by more than 20 micrograms per liter (µg/l). This represents 2 percent of the Environmental

Protection Agency (EPA) secondary standard of 2 milligrams per liter for copper in drinking water (EPA, 1985). The EPA standard is used because the State of Montana sets no standards for the amount of copper allowed in public drinking water supplies (Montana Administrative Code, 16.20.2). The EPA standard is intended to maintain the aesthetic properties that relate to public acceptance of drinking water and is not related to public health. A threshold for the effects of copper on human health has not been determined (EPA, 1985).

Impacts on **surface water or wetlands** that support aquatic plants and animals would not be significant. Potential impacts could occur when the ground plane is less than 300 feet from surface water, if the soil is acidic (pH less than 6.5), or if the depth to the seasonally high water table is less than 3 feet from the ground plane (4 feet from the surface), as discussed in Section 4.2.1.1, page 4.2-3 of the FEIS. All of the soils on the sites are neutral to strongly alkaline and their seasonally high water tables are greater than 3 feet below the ground plane; therefore the potential for copper leachate into surface water is not present, even when intermittent surface water is within 300 feet of the site.

Impacts on **air quality** would not be significant. Temporary but insignificant increases in air pollutant emissions would occur during construction, primarily from greater use of heavy machinery than would be required in normal farming operations. During operation of the BUPG at 100 percent load, total yearly emissions from the BUPG would be less than 350 pounds per pollutant, as described in Section 2.1.2 of this EA. These are well below the standards set by the State of Montana (Administrative Rules of Montana, 16.8.1102), which requires permits for facilities emitting any single regulated substance at the rate of 25 tons per year. Hence, the project would not result in violation of Montana Primary and Secondary Ambient Air Quality Standards. Permits will not be required under Montana Administrative Code, 16.8.1102 (MDHES, 1988).

4.1.2 Biological

The project would have no significant impact on **wetlands and other wildlife habitat**. The habitats affected are locally abundant, and none is unique. One site is a

cultivated field, and the other five are either irrigated or nonirrigated rangeland. None of the sites contains or is within 300 feet of wetlands.

Bird collisions with the tower may occur but are not expected to be significant. The Yellowstone River Valley south of Livingston contains a heron rookery, and trumpeter swans will soon be re-introduced into the valley (Kratville, 1989). Section 4.4.1.5, page 4.4-5 of the FEIS states that most bird collisions occur in adverse weather conditions when the visibility of man-made structures is obscured and birds may be forced to lower their flight level. Visibility in the Livingston area is high, typically 30 miles and only infrequently as low as 10 miles (NPS, 1990). According to local airport records, visibility is very rarely less than 0.5 mile (NCDC, 1990). The potential for collisions would be low because, with rare exception, the tower would be visible by day and its lights would be visible by night. The exceptional periods would pose some risk to waterfowl, which migrate both by night and by day, but the principal transcontinental migration routes lie to either side of the SSA so relatively few migrants, the birds most frequently involved in collisions with towers, would be at risk (USFWS, 1971). The USFWS has recommended that any new or upgraded power lines associated with the GWEN project be raptor-proofed (Appendix C, McMaster, 1989, pages C-3 to C-4 of this EA). Installation and upgrading of the GWEN power lines in south central Montana will be done in accordance with the guidelines provided by the Raptor Research Foundation, Inc. (Olendorff *et al.*, 1981); wires will be insulated and artificial perches will be constructed above trasformers to provide higher and safer places for birds to perch.

Federally listed **threatened or endangered species** are not likely to be adversely affected. This determination was made after informal consultation with the USFWS in compliance with Section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531, *et seq.*, at 1536) (Appendix C, McMaster, 1990, page C-5 of this EA) and the Montana Natural Heritage Program (MNHP, 1989). No prairie dog colonies, which are potential habitat for the black-footed ferret, a federally listed endangered species found predominantly within large prairie dog colonies, were found at any of the sites. The peregrine falcon is not reported to be resident in the SSA at this time, and therefore would not be at risk. Thurber's needlegrass, a grass characterized by the Montana

Natural Heritage Program as globally secure but of uncertain status within Montana, was once collected about 0.5 mile northeast of the Watson site (CGS-4) (MNHP, 1989).

The Shields River Valley is part of a migration corridor for the bald eagle, a species that is the object of a significant management program in Montana. Each individual eagle represents 0.2 to 0.3 percent of the total migratory population in Montana. However, no breeding territories and no potential breeding territories are listed for the Shields River Valley in the Montana Bald Eagle Management Plan (MBEWG, 1986). The USFWS concurs that the bald eagle is not likely to be adversely affected (Appendix C, McMaster, 1990, page C-5 of this EA).

4.1.3 Socio-Cultural

Local employment would be increased slightly, primarily through use of local subcontractors for earth-moving and possibly for some of the facility's maintenance.

Impacts on **community support systems** would not be significant because the relay node will be unmanned and will use modest amounts of power, comparable to that used by an average single-family house. Security needs will be met through agreements with local police officials to monitor the integrity of the site during routine patrols, as detailed in Section 4.6.1.1, page 4.6-1 of the FEIS.

Impacts on **land use** would not be significant. All candidate sites are zoned Agricultural, and there are no local restrictions concerning development of the proposed GWEN facility. Care was taken in the site selection process to maintain setbacks from institutional uses such as schools, churches, recreational areas, and areas zoned residential. The tower would not significantly affect property values because non-noxious, nonresidential land uses, such as the proposed relay node, have no systematic effect on housing values, as stated in Section 4.7.1.3, page 4.7-8 of the FEIS.

Construction **noise** impacts would be temporary and insignificant. Operational noise from the backup generator would be less than 72 dBA at the site boundary. At 50 feet beyond the site boundary the noise level would drop below 65 dBA, as discussed in

Section 2.1.2 of this EA. Although Park County has no noise ordinance, this noise level is within the standards typically set for residential and mixed residential/agricultural use (55 to 65 dBA), as stated in Section 3.5.3, page 3.5-2 of the FEIS. In addition, the BUPG would only operate at this noise level for 2 hours per week during testing and during commercial power outages.

Impacts on **public health and safety** would not be significant, as discussed in Sections 4.11 and 4.12, beginning on pages 4.11-1 and 4.12-1, respectively, of the FEIS. Shock and burn risks would be associated with the buildup of electrical charges on ungrounded metallic objects inside the inner exclusionary (8-foot) fence located approximately 20 feet from the tower base. However, a grounded person within the outer exclusionary (4-foot) fence located approximately 330 feet from the tower base who touches an ungrounded object while the tower was transmitting would experience only a mild shock, sufficient to cause the individual to break contact but not cause harm. Furthermore, because the transmission periods would total between 6 and 8 seconds per hour during normal operations, the risk of even these mild shocks would be insignificant. Only a determined effort to enter the inner exclusionary zones, within the 8-foot fence, would put a person at increased risk of higher shock and a higher specific absorption rate, dependent on the period of prolonged grasping contact with an ungrounded metallic object. Fire hazards at the relay node facility would be low, as discussed in Section 4.12.1.1, page 4.12-1 of the FEIS. Radio-frequency emissions would not cause adverse health effects, as discussed in Section 4.4.1.6, pages 4.4-6 and 4.4-7 of the FEIS. Subsequent to the publication of the FEIS, further study confirmed the conclusion of the FEIS that there is no evidence of adverse effects of GWEN radio-frequency emissions on public health (NRC, 1992).

The relay node would operate in the LF band and therefore would not interfere with pacemakers, emergency communications, commercial and amateur radios, televisions, or garage door openers, as noted in Section 2.1.1.1, page 2-3 of the FEIS.

Impacts on **archaeological resources** are unknown on the Foster site (CGS-2) because the site was withdrawn before the on-site archaeological survey was completed. Impacts on archaeological resources at the other five sites would not be

significant because the on-site archaeological survey revealed no significant cultural remains on any of the CGSs surveyed (Bergstrom, 1990). The Montana SHPO concurs with this determination (Appendix C, Schwab, 1990, page C-7 of this EA). Should the Foster (CGS-2) site be used, an archaeologist would be present during construction. The Montana SHPO indicated that portions of the Yellowstone River Valley south of Livingston have been proposed as worthy of designation as an archaeological district. Even if this portion of the valley were to become eligible for the NRHP because of archaeological finds nearby, there would be no significant impact because the finds would not be in the area of ground disturbance and archaeological resources are not subject to visual impact. If any archaeological resources are found during construction, work that might affect them will be suspended while the Montana SHPO is notified in accordance with the provisions of 16 USC 470, *et seq.*, at 470f.

Impacts on **historic properties** are unknown on the Foster (CGS-2), O'Hair-North (CGS-12A), and O'Hair-South (CGS-12B) sites because these sites were withdrawn before the survey of historic properties could be completed. Impacts on historic properties at the Sarrazin site (CGS-1) would be significant. Impacts on historic properties at the Watson (CGS-4) or Meigs (CGS-9) site would not be significant. The Montana SHPO concurs with this determination (Appendix C, Huppe, 1990, pages C-8 through C-12 of this EA; Appendix C, Huppe, 1991, page C-13 of this EA). The impacts on historic properties associated with each site are discussed in Sections 4.2 to 4.7 of this EA.

Significant impacts to **Native American traditional, religious, or sacred sites** are not anticipated. At BIA recommendation, the Crow Cultural and Historical Commission was notified, the GWEN project was explained, and information was requested regarding traditional, religious, or sacred sites located within the SSA. A representative of the Commission responded that the tribe has no concerns with the GWEN project (Old Coyote, 1990).

Visual impacts associated with a GWEN tower are discussed in Sections 3.8 and 4.8, pages 3.8-1 and 4.8-1, respectively, of the FEIS. The significance of a visual impact would depend on the visual dominance of the GWEN facility and the sensitivity of the

affected views. Visual dominance is the degree to which a GWEN facility would compete with other features of the existing landscape for the attention of the viewer. Section 3.8.4, beginning on page 3.8-3 of the FEIS defines four levels of dominance, called Visual Modification Classes (VMC):

- VMC 1, not noticeable: the tower would be overlooked by all but the most interested viewers

- VMC 2, noticeable, visually subordinate: the tower would be noticeable to most viewers without being pointed out but would not compete with other features for their attention

- VMC 3, distracting, visually codominant: the tower would compete with other features in the landscape for the viewer's attention

- VMC 4, visually dominant, demands attention: the tower would be the focus of attention and tend to dominate the view.

Visual sensitivity is a measure of the public's reaction to a proposed change of the affected view and is a function of the viewer's activity, awareness, goals, and values. Consequently, the more sensitive the view, the stronger will be the public reaction to any alteration of it. Areas defined in the FEIS as having high visual sensitivity include national and state parks; designated scenic routes; designated national, state, or local historic sites where setting is important to their historic significance; and travel routes providing primary access to these sites. Examples of areas having medium visual sensitivity would be locally popular, but undesignated, beaches or public use areas and the travel routes that provide primary access to them. Travel routes that pass near or provide access to high sensitivity views, such as historic properties, but primarily serve other destinations are considered medium sensitivity. Travel routes are considered sensitive on segments within 0.5 mile of the property and 1.5 miles of the tower, based on FEIS criteria and review by visual analysis specialists (Duffey, 1991). Low visual

sensitivity includes those views from sites, areas, travel routes, and sections of travel routes not identified as medium and high in sensitivity.

Significant visual impacts would occur if the relay node facility were to dominate or codominate (VMC 4 or 3) a high-sensitivity view or dominate (VMC 4) a medium-sensitivity view. If the relay node facility cannot be seen from medium-to-high sensitivity routes or areas, then visual impacts are not considered significant. Distance is the primary factor in determining visual dominance and therefore visual impacts. At distances greater than 3 miles, a GWEN tower would not be visible to the unaided eye. At 1.5 to 3 miles, the tower would be visually subordinate if noticeable (VMC 2) but more usually would not be noticed (VMC 1) because of its grey color and lack of mass. If a viewer at this distance actively sought the tower, it would appear as a thin vertical line on the horizon. Within 1.5 miles, the tower becomes a more important component of the view. In addition, other aspects of the tower's setting, such as focal point sensitivity, skyline complexity, competing feature interest, and topographic and vegetative screening, become important considerations in determining the level of visual impact.

USGS topographic maps and a windshield survey were used to determine whether high or medium sensitivity views were within 1.5 miles of a CGS. The visual impacts associated with each site are discussed in Sections 4.2 to 4.7 of this EA.

4.2 Alternative 1: Sarrazin Site (CGS-1)

Significant impacts are expected.

Impacts on **historic properties** would be significant. This site is located in the Shields River Valley, which is potentially eligible for listing on the NRHP as a rural historic landscape. If this valley were to become eligible for the NRHP, a GWEN tower could adversely affect this historic landscape, potentially disturbing and significantly altering a powerful sense of time and place. However, the project would have no impact on the Gothic-roofed barn, the log house, or the Shields River branch of the Northern Pacific Railroad. Setting is not important to their eligibility for the NRHP (Brownell and

Karsmizki, 1990), so their eligibility would not be affected by potential visual impacts from a GWEN tower.

Bird collisions with the tower or the power lines would not be significant for reasons discussed in Section 4.1.2 of this EA. The site is in the Shields River Valley, a migration corridor for the bald eagle, but no breeding territories and no potential breeding territories are listed for the Shields River Valley in the Montana Bald Eagle Management Plan (MBEWG, 1986) and the USFWS concurs that the bald eagle would not be significantly impacted (Appendix C, McMaster, 1990, page C-5 of this EA).

Visual impacts would not be significant because, except for historic properties, there are no high or medium sensitivity views within 1.5 miles of the site.

4.3 Alternative 2: Foster Site (CGS-2)

Complete impacts are unknown because the site was withdrawn before the archaeological survey and the historic properties survey could be completed.

However, significant impacts on **historic properties** are expected. The site sits in the Shields River Valley, which is potentially eligible for listing on the NRHP as a rural historic landscape. If this valley were to become eligible for the NRHP, a GWEN tower could adversely affect this historic landscape, potentially disturbing and significantly altering a powerful sense of time and place. However, the project would have no impact on the Gothic-roofed barn, the log house, or the Shields River branch of the Northern Pacific Railroad because setting is not important to their eligibility for the NRHP (Brownell and Karsmizki, 1990).

Bird collisions with the tower would not be significant for reasons discussed in Section 4.1.2 of this EA. The site is in the Shields River Valley, a migration corridor for the bald eagle, but no breeding territories and no potential breeding territories are listed for the Shields River Valley in the Montana Bald Eagle Management Plan (MBEWG, 1986) and the USFWS concurs that the bald eagle would not be significantly impacted (Appendix C, McMaster, 1990, page C-5 of this EA).

Visual impacts would not be significant because, except for historic properties, there are no high or medium sensitivity views within 1.5 miles of the site.

4.4 Alternative 3: Watson Site (CGS-4)

No significant impacts are expected.

Bird collisions with the tower would not be significant for reasons discussed in Section 4.1.2 of this EA. The Yellowstone River, which provides the most suitable habitat for bald eagles, waterfowl, and other migratory birds, is 1.8 miles to the west and the site is well above the floodplain with its riparian forests and wetlands.

Impacts on **historic properties** would not be significant. The survey of historic properties identified no properties listed, eligible, or potentially eligible for the NRHP within 1.5 miles of the site (Brownell and Karsmizki, 1990).

4.5 Alternative 4: Meigs Site (CGS-9)

No significant impacts are expected.

Bird collisions with the tower would not be significant for reasons discussed in Section 4.1.2 of this EA. The Yellowstone River, which provides the most suitable habitat for bald eagles, waterfowl, and other migratory birds, is 1 mile to the east. The site is set back within a broad indentation in the line of hills along the western side of the valley.

Impacts on **historic properties** would not be significant. The survey of historic properties identified radio station KPRK, 1.4 miles to the southeast, and the Livingston Ditch, 0.2 mile to the southeast, as eligible for listing on the NRHP. However, setting is not considered important to their eligibility. Therefore, the eligibility of these historic properties would not be affected by potential visual impacts from a GWEN tower (Brownell and Karsmizki, 1990; Appendix C, Huppe, 1991, page C-13 of this EA).

Visual impacts would not be significant. Residential areas of Livingston are within 1.5 miles of the site and are a high sensitivity view. However, the tower would not be visible from these residential areas because of topographic screening by the 100- to 300-foot hills immediately west of town.

4.6 Alternative 5: O'Hair-North Site (CGS-12A)

Complete impacts are unknown.

Impacts on **historic properties** are unknown because this site was withdrawn before the historic structures survey could be completed.

Bird-tower collisions are not expected to be significant for reasons discussed in Section 4.1.2 of this EA. The site is 0.6 mile west of the Yellowstone River and 1 mile south of the lakes in this portion of the Yellowstone River Valley. These setbacks from both the lakes and the river are adequate to allow even the less agile waterfowl to see and avoid a tower at either of these sites in clear weather. Given the high visibility in the Livingston area (NCDC, 1990) and the equally good visibility to the south at Yellowstone National Park (NPS, 1990), the potential for collisions would be low because, with rare exception, the tower would be visible by day and its lights would be visible at night.

Visual impacts would not be significant. The Yellowstone River, which is a recreational trout fishery of national renown and, therefore, is of high sensitivity, is 0.6 mile to the east of the site. It has the potential to be visually impacted by the presence of the tower. However, the river is lined with riparian forests that would block views of the tower from the banks of the river during the fishing season, so no significant visual impact on this recreation area would result. The primary access route to the fishing area, Pine Creek Road, is approximately 1 mile from the site and would also be high sensitivity. While travelling along this road and looking north towards the tower, a viewer would see the tower against the mountains, which rise to over 2,000 feet above the level of the site, in the background. The tower would not break the skyline and would be, because of

distance, visually subordinate (VMC 2); no significant visual impacts to the view would result.

4.7 Alternative 6: O'Hair-South Site (CGS-12B)

Complete impacts are unknown.

Impacts on **historic properties** are unknown because this site was withdrawn before the historic structures survey could be completed.

Visual impacts would be significant. Pine Creek Road, which serves as primary access to a trout fishing access station on the Yellowstone River at Pine Creek Bridge, and therefore is of high sensitivity, is adjacent to the south side of the site. Although viewers travelling on the road and looking north toward the tower would see the tower against mountains in the background, the upper third of the tower would still be visible above the skyline. There are no competing features and no vegetative screening, and, due to proximity to the road, the tower would be visually dominant (VMC 4) and would cause a significant visual impact.

The Yellowstone River, which is a recreational trout fishery of national renown and, therefore, is of high sensitivity, is 0.4 mile to the east of the site. The river also has the potential to be visually impacted by the presence of the tower. However, the river is lined with riparian forests that would block views of the tower from the banks of the river during the fishing season. Therefore, no significant visual impact to this recreation area would result.

Bird-tower collisions would not be significant for reasons discussed in Section 4.1.2 of this EA. The site is 0.5 mile west of the Yellowstone River and 2 miles south of the lakes in this portion of the Yellowstone River Valley. These setbacks from both the lakes and the river are adequate to allow even the less agile waterfowl to see and avoid a tower at either of these sites in clear weather. Given the high visibility in the Livingston area (NCDC, 1990) and the equally good visibility to the south at Yellowstone National

Park (NPS, 1990), the potential for collisions would be low because, with rare exception, the tower would be visible by day and its lights would be visible at night.

4.8 No Action Alternative

No environmental impact would result from adoption of the no action alternative.

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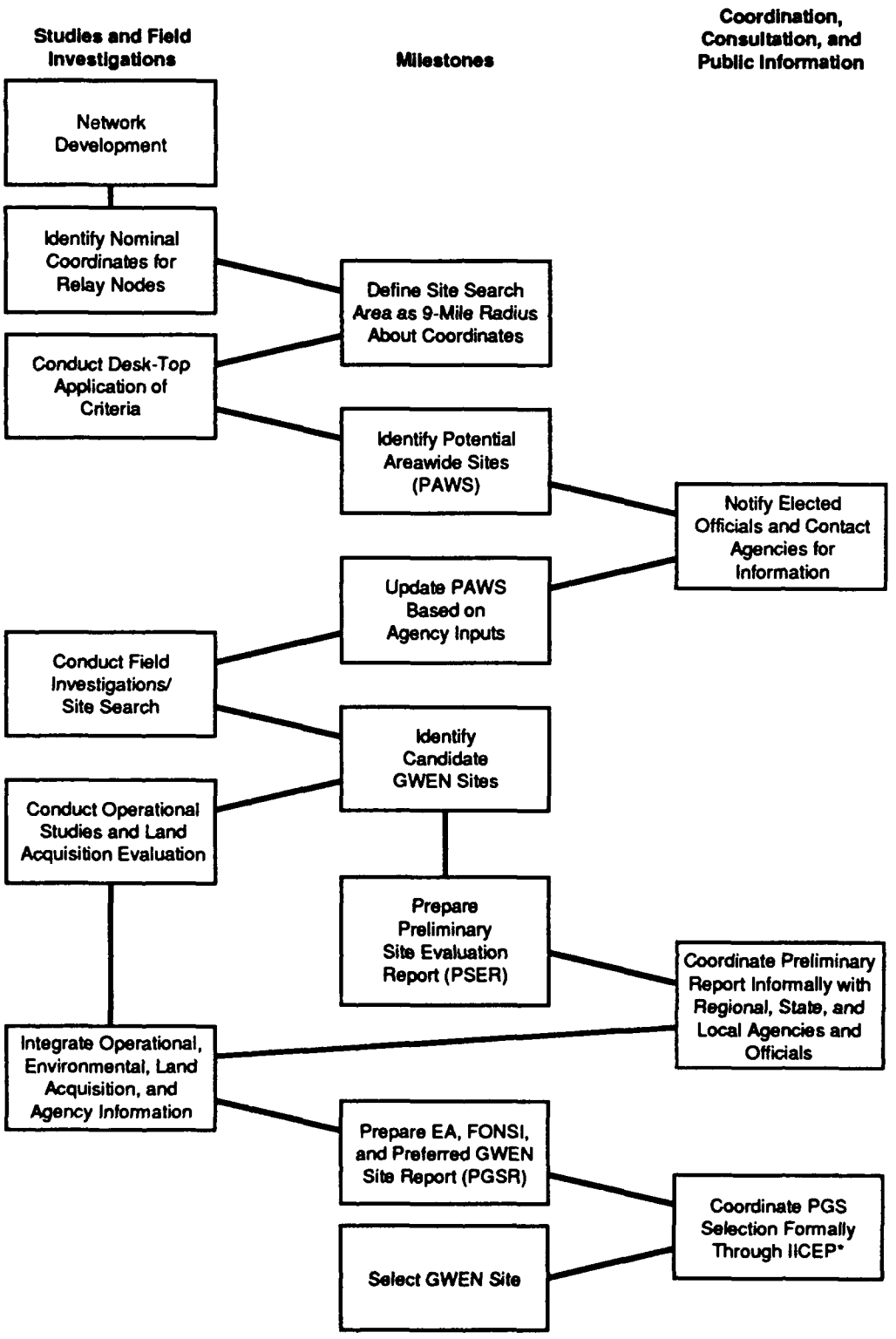
APPENDIX A

SITE SELECTION PROCESS

SITE SELECTION PROCESS

Figure A.. of this EA shows the sequence of events during the selection of individual GWEN sites. Figure A.2 of this EA describes the screening process used during the field investigation to choose the six candidate GWEN sites (CGSs). The environmental siting criteria applied in the site selection process are defined in Tables 5-1 and 5-2, pages 5-7 through 5-14 of the FEIS.



*IICEP = Interagency Intergovernmental Coordination for Environmental Planning.

FIGURE A.1 GROUND WAVE EMERGENCY NETWORK SITE SELECTION PROCESS

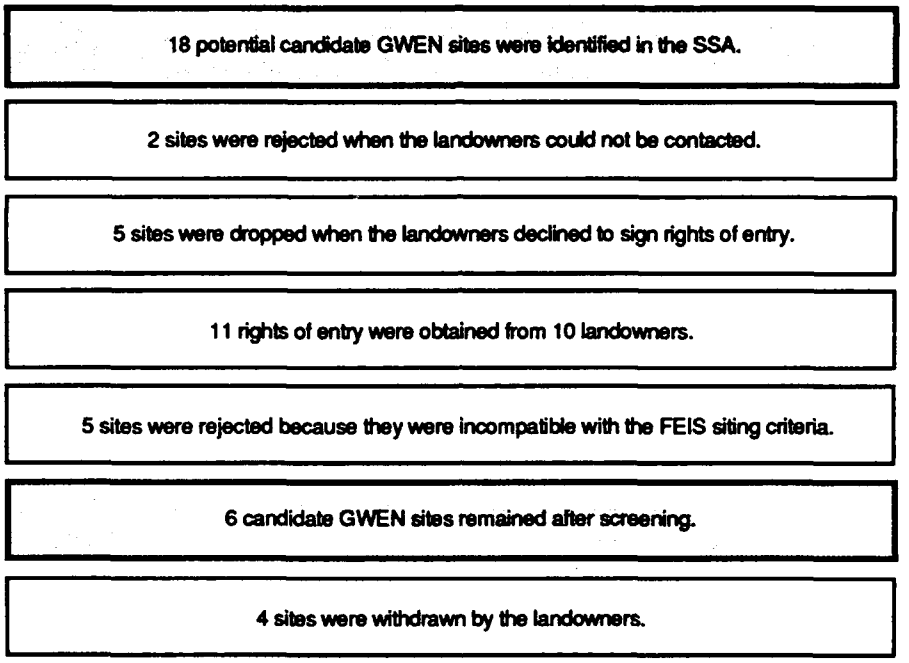


FIGURE A.2 RESULTS OF USING FEIS SITING CRITERIA TO SCREEN POTENTIAL CANDIDATE GWEN SITES IN THE SOUTH CENTRAL MONTANA SITE SEARCH AREA

APPENDIX B

TOPOGRAPHIC SETTINGS OF CANDIDATE GWEN SITES

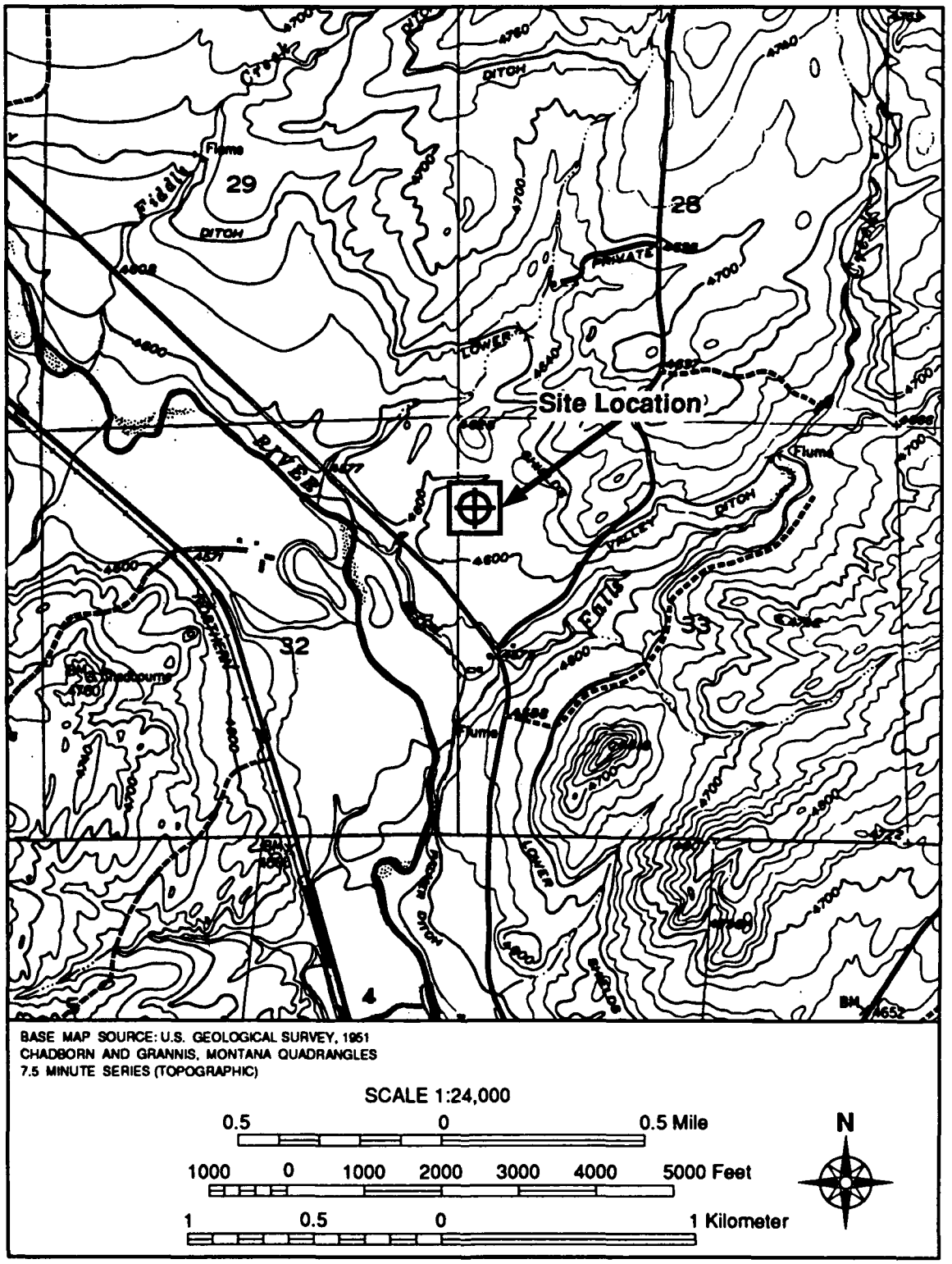


FIGURE B.1 TOPOGRAPHIC SETTING OF THE SARRAZIN SITE (CGS-1)

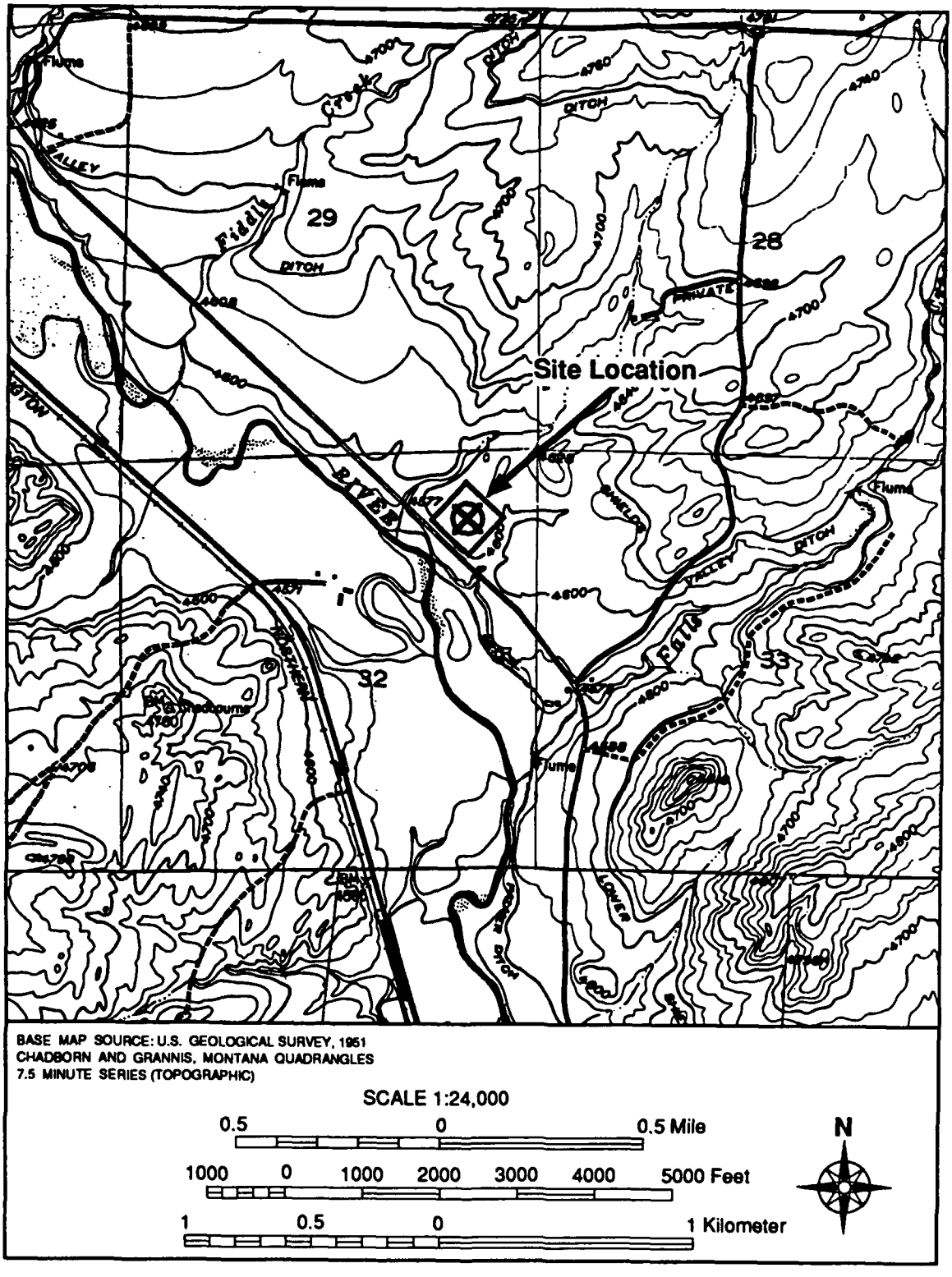
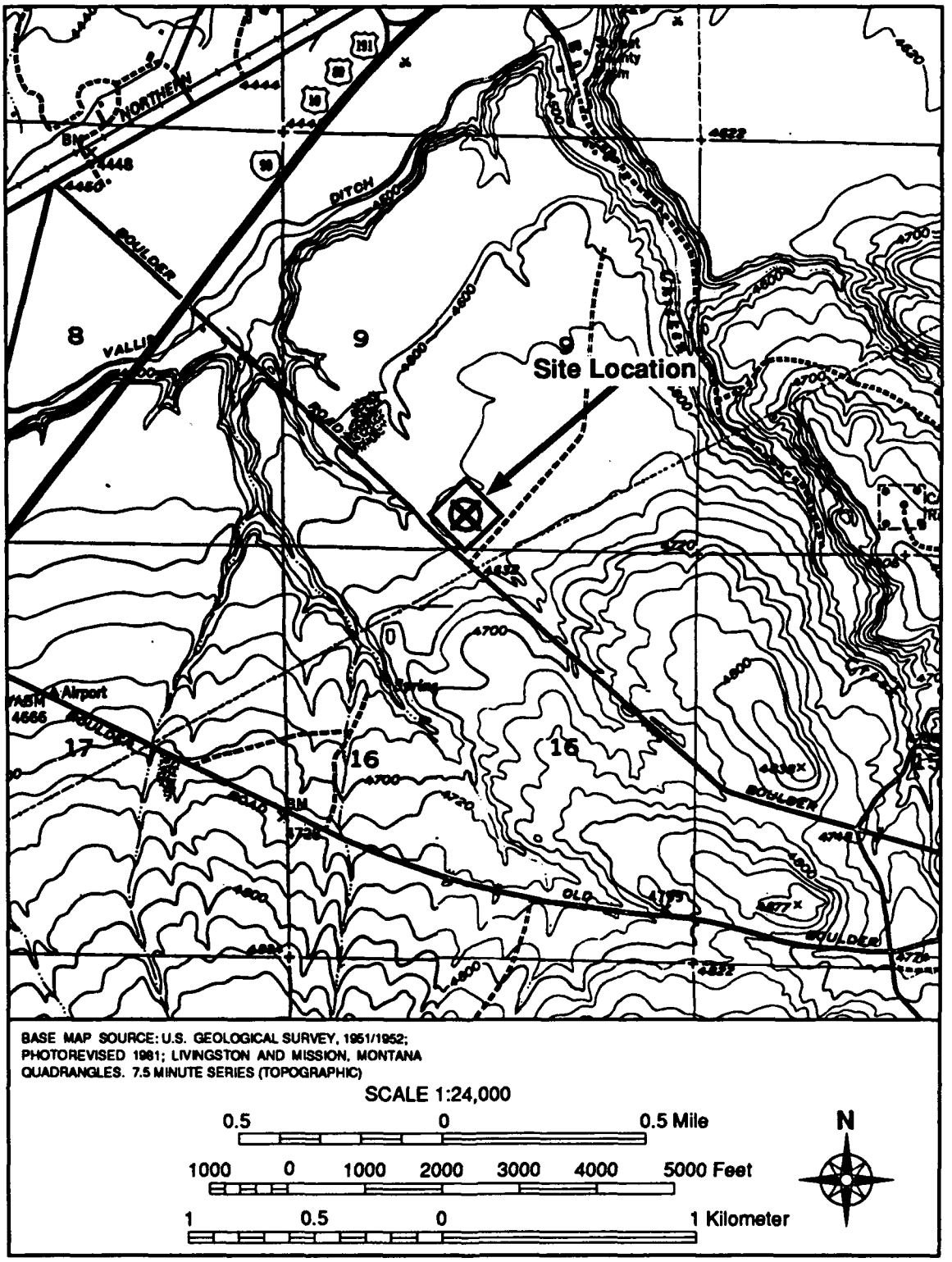


FIGURE B.2 TOPOGRAPHIC SETTING OF THE FOSTER SITE (CGS-2)



BASE MAP SOURCE: U.S. GEOLOGICAL SURVEY, 1951/1952; PHOTOREVISED 1981; LIVINGSTON AND MISSION, MONTANA QUADRANGLES. 7.5 MINUTE SERIES (TOPOGRAPHIC)

FIGURE B.3 TOPOGRAPHIC SETTING OF THE WATSON SITE (CGS-4)

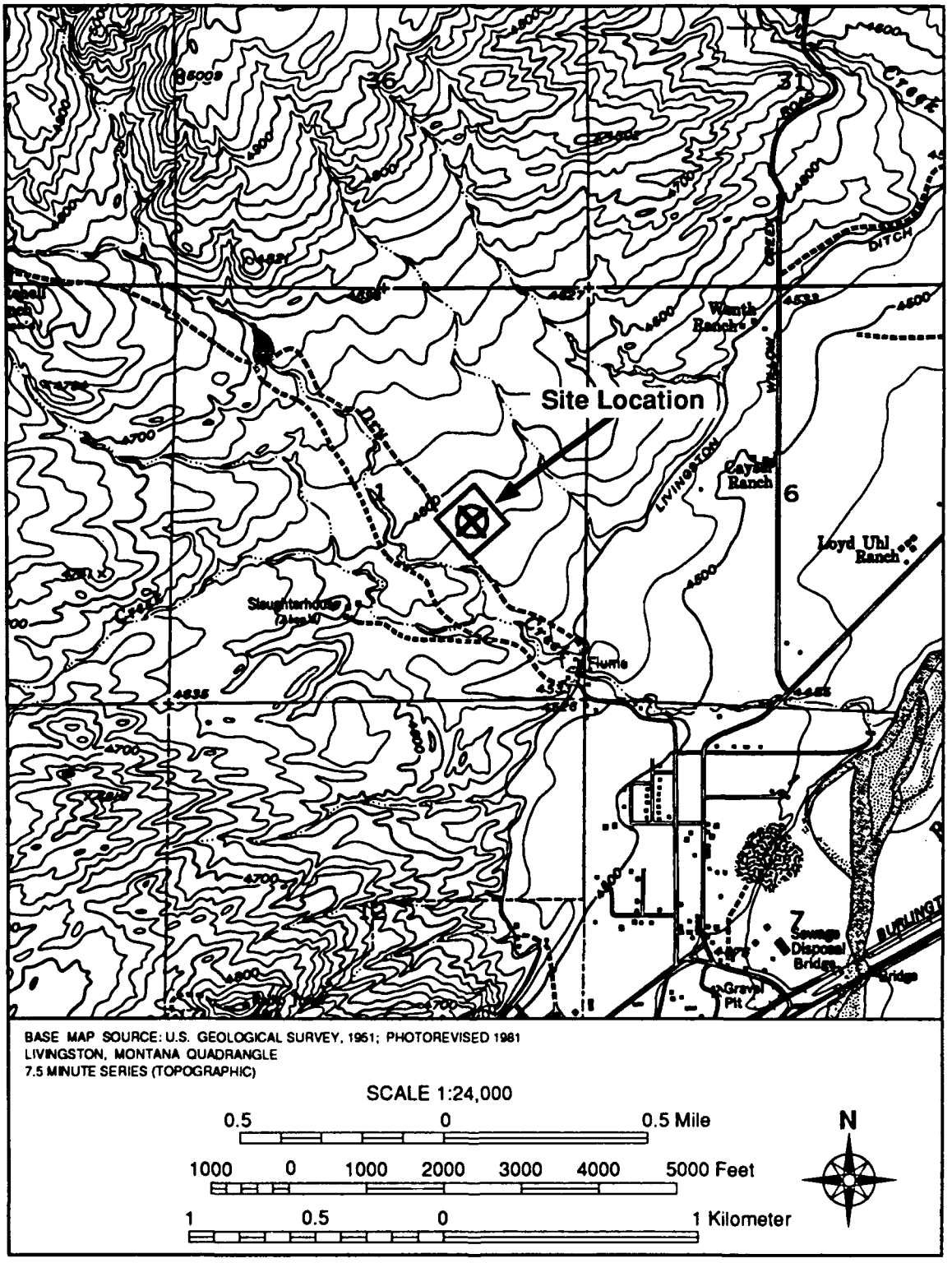
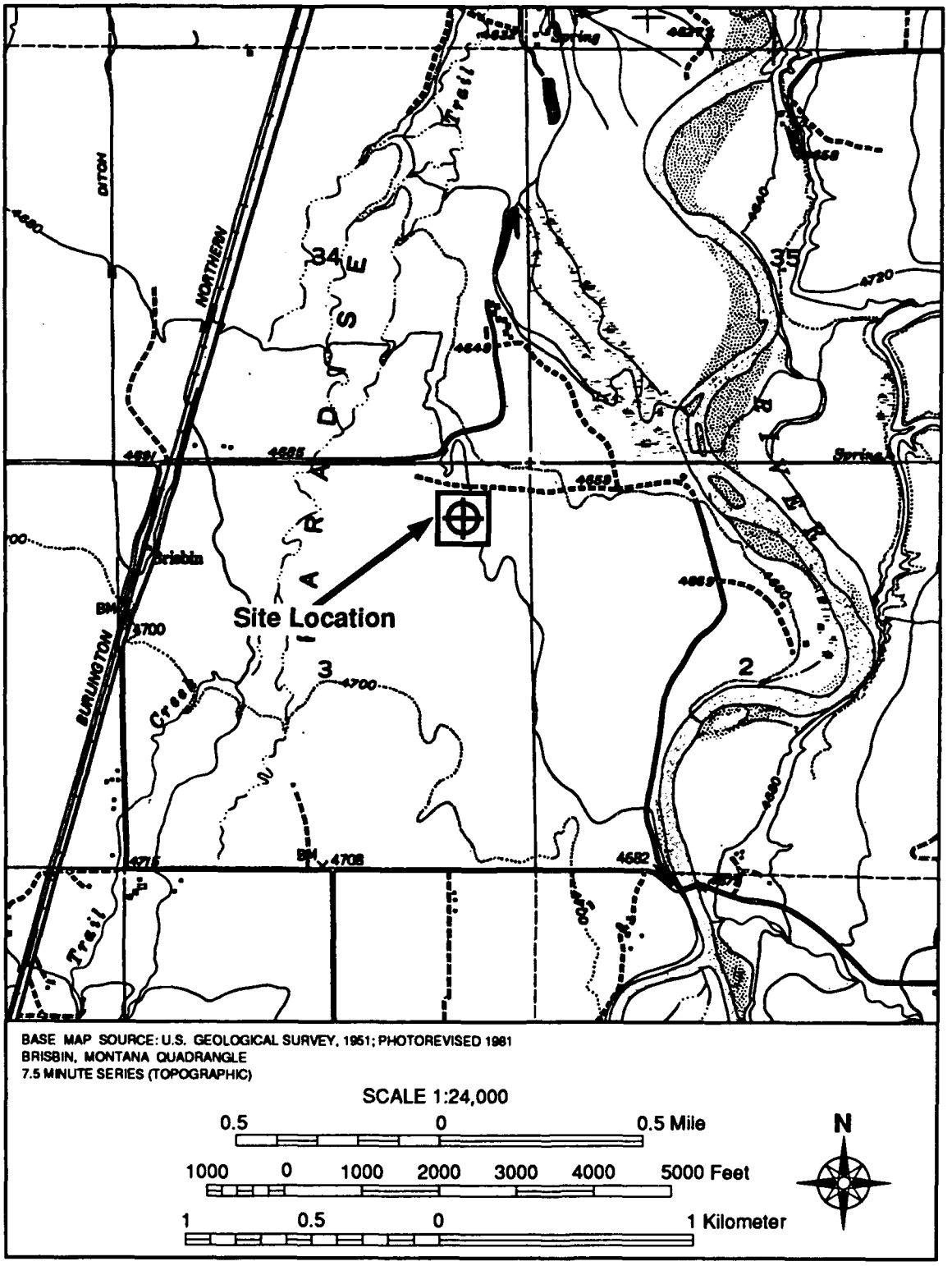


FIGURE B.4 TOPOGRAPHIC SETTING OF THE MEIGS SITE (CGS-9)



BASE MAP SOURCE: U.S. GEOLOGICAL SURVEY, 1951; PHOTOREVISED 1981
BRISBIN, MONTANA QUADRANGLE
7.5 MINUTE SERIES (TOPOGRAPHIC)

FIGURE B.5 TOPOGRAPHIC SETTING OF THE O'HAIR - NORTH SITE (CGS-12A)

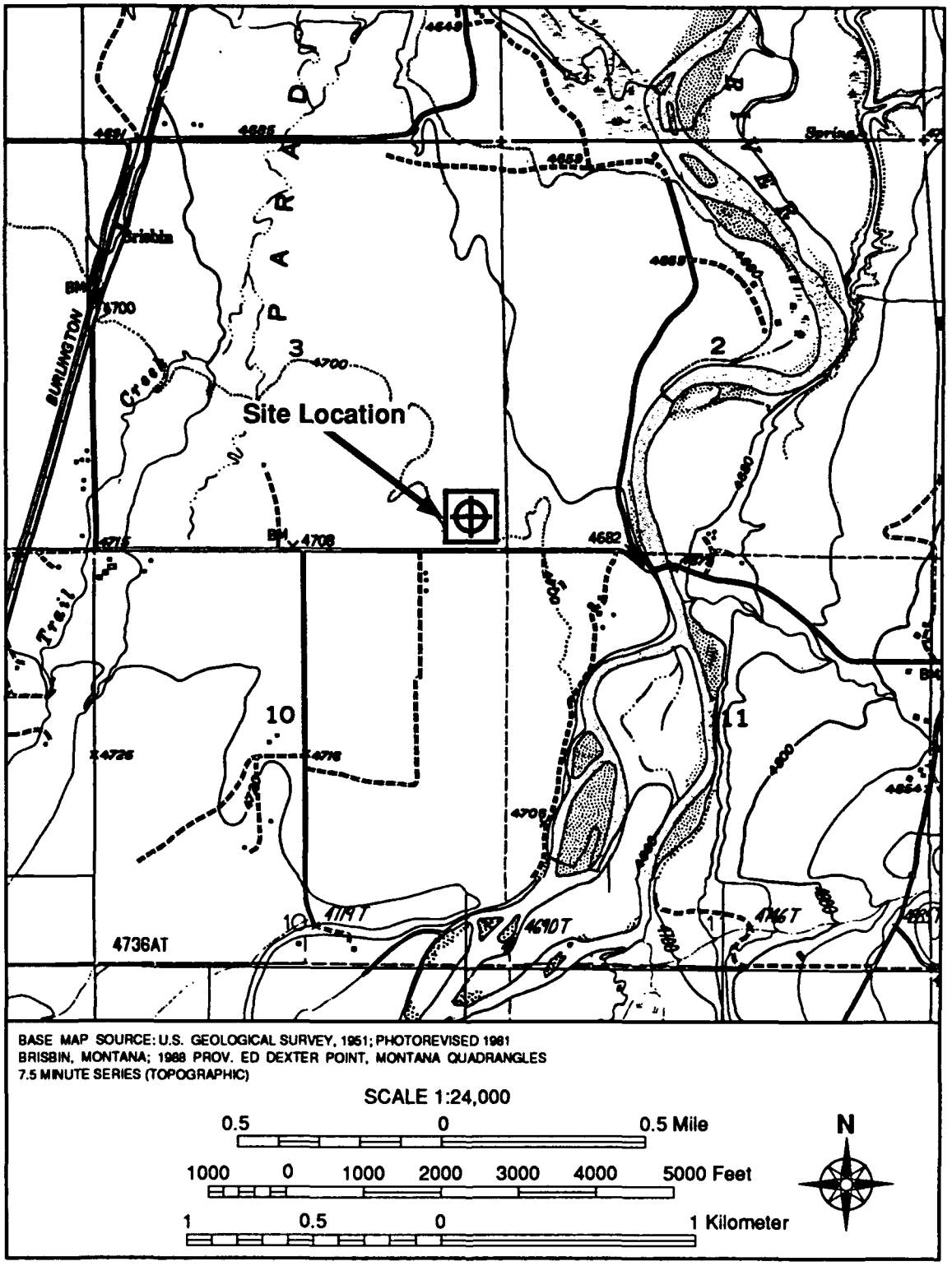


FIGURE B.6 TOPOGRAPHIC SETTING OF THE O'HAIR - SOUTH SITE (CGS-12B)

APPENDIX C

CORRESPONDENCE

CORRESPONDENCE

Appendix C documents contacts with the following federal and state agencies and Native American groups:

Individual	Agency	Date	Response
Kemper McMaster, Acting State Supervisor, Montana State Office	U.S. Department of the Interior, Fish and Wildlife Service	11-16-89 06-26-90	Attached Attached
David Schwab, State Archaeologist	State Historic Preservation Office, Montana Historical Society	10-02-89 05-18-90	Attached Attached
Katherine M. Huppe, Historical Survey Reviewer	State Historic Preservation Office, Montana Historical Society	08-28-90 10-24-90 03-20-91	Attached Attached Attached
Dale Harms, State Supervisor, Montana State Office	U.S. Department of the Interior, Fish and Wildlife Service	04-30-92 01-08-93	Attached Attached
Lloyd Old Coyote, Culture Committee	Crow Cultural and Historical Committee, Crow Agency, Montana	A letter was sent on 08-01-89 but no written response has been received. Phone communication on 01-10-90 (see pages 3-10 and 5-4 of this EA).	

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Federal Bldg., U.S. Courthouse
301 South Park
P.O. Box 10023
Helena, Montana 59626

IN REPLY REFER TO:
FWE-61130-Billings
M.37 GWEN

November 16, 1989

Mr. Robert T. Veale, Major
Deputy Program Manager, GWEN
Department of the Air Force
Headquarters Electronic Systems Division (AFSC)
Hanscom Air Force Base, Massachusetts 01731-5000

Dear Mr. Veale:

The U.S. Fish and Wildlife Service (Service) has reviewed the Preliminary Site Evaluation Reports (PSER) for the potential Ground Wave Emergency Network (GWEN) sites for western Montana (NODE 4C926MT), south central Montana (NODE 4C925MT) and northeastern Montana (NODE 4C932MT).

Information provided for review indicates that commercial power sources will be used for electrical needs at selected sites. The PSER does not indicate whether or not the installations will require construction of new powerlines. While we foresee no substantive bald eagle or peregrine falcon concerns with the proposed tower sites, the Service does recommend that any new or upgraded powerlines required for the proposal be raptor-proofed following the criteria and techniques outlined in Raptor Research Report No. 4, "Suggested Practices for Raptor Protection on Powerlines - The State of the Art in 1981". A copy of the report can be obtained for $20.00 from:

Jim Fitzpatrick, Treasurer
Raptor Research Foundation
Carpenter.St. Croix Nature Center
12805 St. Croix Trail
Hastings, Minnesota 55033

We also recommend that your investigations address whether or not migratory birds protected by Federal law are likely to suffer mortality as a result of striking project towers or associated guy wires, etc. In that regard, two of the sites in northeast Montana (CGS-2 and CGS-3) are located near riparian areas along the Little Muddy Creek and are within 1-1/2 to 2 miles of the Missouri River. In south central Montana site CGS-12a and CGS-12b are near riparian areas along the Yellowstone River and sites CGS-1 and CGS-2 are within the Shields River Valley which is a significant migration route for bald and golden eagles. As a result, the potential for bird strikes at these sites is of particular concern and should be carefully evaluated.

We appreciate the Air Force's efforts to consider and conserve endangered species and their habitat. If you have additional questions regarding endangered species, please contact Dennis Christopherson of my staff at (406) 657-6750.

Sincerely,

Kemper McMaster
Acting State Supervisor
Montana State Office

cc: Billings Suboffice, Fish and Wildlife Enhancement (Billings, MT)

DCHRISTOPHERSON/dc/clh

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Federal Bldg., U.S. Courthouse
301 South Park
P.O. Box 10023
Helena, Montana 59626

IN REPLY REFER TO:

FWE-61130-Billings

June 26, 1990

Mr. Buford Holt
Senior Consultant
SRI International
333 Ravenswood Avenue
Menlo Park, California 94025

Dear Mr. Holt:

We have received your letter dated June 6, 1990, and attachments, concerning the risk to bald eagles associated with alternative sites for the U.S. Air Force proposed Ground Wave Emergency Network (GWEN) in the Shields River Valley, Montana. You requested our evaluation of the conclusion that bald eagles will not be significantly impacted by these proposals.

Based on review of the materials you submitted, we concur that the two alternative sites assessed are not likely to adversely affect bald eagles using the Shields River Valley. We note, however, that this river corridor is heavily used by migrating eagles on a seasonal basis. Since, in our opinion, eagles following the river corridor would likely be at a higher risk from the Foster site (which is located only about 300 feet from the north shore of the Shields River), we strongly recommend selection of the Serrazin site, if either of these sites are constructed. The latter site, which is more than a quarter-of-a-mile from the north shore of the river, appears likely to pose significantly less risk to eagles, as well as to other avian species migrating along the river.

We appreciate the efforts of the Air Force to consider endangered species in their project planning. If you have questions regarding this response, please contact Mr. Gary Wood of my staff at (406) 657-6750.

Sincerely,

Kemper McMaster
Field Supervisor
Montana/Wyoming Field Office

cc: Suboffice Coordinator, USFWS, Fish & Wildlife Enhancement (Billings, MT)

JGW/dc

"Take Pride in America"

State Historic Preservation Office
Montana Historical Society
Mailing Address: 225 North Roberts • Helena, MT 59620-9990
Office Address: 102 Broadway • Helena, MT • (406) 444-7715

October 2, 1989

Buford Holt
SRI International
333 Ravenswood Ave.
Menlo Park, CA 94025

RE: Gwen Project sites in Park County, Montana

Dear Dr. Holt

Thank you for the update on your review of Gwen Tower sites. We believe that the proposed locations for construction have potential for the presence of significant cultural resources. The Upper Yellowstone River valley is recognized as a significant region for history and prehistory in Montana. All proposed construction sites are located in upland locations adjacent to permanent waterways. According to site modeling information, such locations have high cultural resource site potential. Stone circle sites, lookout sites, lithic scatters, stone alignments and ceremonial stone constructs have all been recorded in similar locations in the region.

We recommend that an intensive* cultural resource survey be conducted in the final preferred tower site location prior to construction to insure consideration of significant cultural resources in compliance with Section 106 of the National Historic Preservation Act. I have enclosed a listing of professional consultants in the state of Montana as requested.

Thank you for consulting with us.

Sincerely,

David Schwab
State Archaeologist

file: Air Force GWEN

* Confirmed 11/1/89 that this means a systematic walk-over by a trained observer. Not a shovel test survey.

State Historic Preservation Office
Montana Historical Society
Mailing Address: 225 North Roberts • Helena, MT 59620-9990
Office Address: 102 Broadway • Helena, MT • (406) 444-7715

May 18, 1990

Daniel Rutledge
SRI International
333 Ravenswood Avenue
Menlo Park, CA 94025

RE: Cultural Resource Survey Reviews

Dear Mr. Rutledge:

Following are our comments on the three GWEN reports you forwarded for our review.

Culbertson and Bainville Sites: We concur with the archaeologist's methods, results and recommendations. Archaeological monitoring of construction on the McCann site appears to be warranted should construction occur there. Otherwise, it appears unlikely that significant cultural resources will be directly impacted by the proposed construction.

Livingston Sites: We agree with the archaeologist's methods, results and recommendations. Archaeological monitoring of the Foster site appears to be warranted should construction occur there. Otherwise, it appears unlikely that significant cultural resources will be directly impacted by the proposed construction.

Epsie Sites: We concur with the archaeologist's methods, results and recommendations. We concur that Site 24PR1541 appears to be eligible for listing on the National Register of Historic Places. Should the Alderman-B site be chosen for construction, efforts should be made to ensure avoidance of 24PR1541 or to mitigate construction impacts if the site cannot be avoided.

Thank you for consulting with us.

Sincerely,

David Schwab
State Archaeologist

File: Air Force (GWEN)

State Historic Preservation Office
Montana Historical Society
Mailing Address: 225 North Roberts • Helena, MT 59620-9990
Office Address: 102 Broadway • Helena, MT • (406) 444-7715

August 28, 1990

Daniel Rutledge, Research Analyst
SRI International
333 Ravenswood Avenue
Menlo Park, CA 94025

Re: Air Force Candidate GWEN Sites
Park County, MT

Dear Mr. Rutledge:

Thank you for the opportunity to review Western History Research's cultural resource inventory for the proposed GWEN sites in Park County. Their report should prove extremely useful at this stage in your project, and the Air Force should be complimented for their early and appropriate use of historical information as a part of project planning.

We basically agree with your conclusions and the recommendations of your consultants that selection of either the Watson or Megis Site for tower construction would have little potential to impact significant historic properties. In the Megis study area, KPRK is significant, but it is located on the periphery of the study area. Its immediate setting, which we do not necessarily consider unimportant, already contains a radio tower and a dish. Under the circumstances, it would appear that construction of the GWEN tower would, indeed, have no effect on the qualities which make the KPRK building eligible. We concur that 24PA893 retains too little integrity to qualify for Register listing. We also concur that sufficient research has been done to demonstrate that most of the buildings at the Peterson Farmstead, where access was denied, were constructed after the historic period.

We have several comments for the Sarrazin Site. First, we agree that 24PA895 has been altered to an extent that will no longer qualify for independent listing. It does, however, appear to retain sufficient integrity to qualify as a contributing element in either a historic homesteading or a rural historic landscape district.

From the information presented, we agree that 24PA894 is also ineligible for listing in the National Register. Although we understand the consultant's evaluation of Feature 1 at that site, we believe it would be unlikely to qualify under Criterion C. In addition to the siding, the gable hoods, concrete chimney and

undated shed roof addition also appear to compromise its integrity in the photos provided. We would, however, be willing to reconsider our opinion in light of additional information from the consultant.

For 24PA892, while we agree that addition of a new house and garage to the property have been intrusive, we believe the collection of farm buildings at the site is so extensive and so well preserved that the property as a whole can still qualify for listing under Criteria A and C. The original house at the site appears to be Structure 16, so the entire collection of buildings serves to illustrate the evolution of a successful homestead. Should further work become necessary, if the Sarrazin Site is the selected alternative, we would recommend that the farmstead be considered a district, with the new house and barn treated as noncontributing elements. The design, layout and setting of the farmstead remain unchanged, as far as we can see, so this property would also obviously contribute to any landscape or historic homesteading district defined for the area.

The consultants suspect a rural historic landscape district may exist in the project area, and we concur with their recommendation that if the Sarrazin site is selected for GWEN construction additional research will be needed to define and evaluate the significance of such a district. The research presented in the body of Western's report suggests that there may also be a definable homestead era historic district in the project area. Definition of either district would have to include additional inventory of historic and landscape properties like the irrigation system evident on area maps, and probably some of the farmsteads omitted in the first round of inventory. Western has, appropriately in our opinion, only defined the possibility of such a district for the alternative selection stage of your project. Should the Sarrazin site be selected, we would be happy to discuss the inventory and evaluation needs in greater depth with both you and Western.

In our official State Historic Preservation Office capacity, we are supposed to comment directly to the Federal agency in charge of an undertaking. Since historic properties which are potentially eligible for listing in the National Register have been identified as part of the GWEN planning effort, we would appreciate a statement from the Air Force concerning whether or not they agree with the consultant and our office that neither 24PA893 or 895 can qualify for listing in the National Register. We would also like an agency position concerning the potential eligibility of Feature 1 at 24PA894. Western believes the building is independently eligible; we believe there has been sufficient loss of integrity that it can no longer qualify. We would also appreciate consultation with the agency for 24PA892, which we believe to be eligible for listing. While we are happy

to send the Air Force our comments on the entire report through you, in order to complete Section 106 compliance consultation we need to work directly with the Federal agency. That being the case, we will anticipate further consultation on this project.

Thank you for the opportunity to comment.

Sincerely,

Katherine M. Huppe

Katherine M. Huppe
Historical Survey Reviewer

File: Comp/USAF, GWEN/1990

State Historic Preservation Office
Montana Historical Society
Mailing Address: 225 North Roberts • Helena, MT 59620-9990
Office Address: 102 Broadway • Helena, MT • (406) 444-7715

October 24, 1990

Stephen T. Martin, Lt Col
GWEN Program Manager
Department of the Air Force
Headquarters Electronic Systems Division
Hanscom Air Force Base, MA 01731-5000

Re: GWEN sites in Park County, MT

Dear Lt. Col. Martin:

Thank you for your letter and for establishing your agency's position regarding the National Register eligibility of the cultural resources recorded as part of initial inventory for this project. Since you concur with the recommendations in the report, we assume that means:

a) you agree that there will be no effect to the Register eligible KPRK radio station building if the Megis site is selected;

b) you agree that 24PA893 retains too little integrity to qualify for NRHP listing;

c) you agree that 24PA895 cannot qualify independently for listing in the National Register, but may contribute to a historic homesteading or rural historic landscape district;

d) you agree with the consultant that Feature 1 at 24PA894 is eligible under Criterion C. Since our office disagreed with this finding, for the reasons stated in our letter to Rutledge of August 28, we have failed to reach consensus for that building. We therefore recommend that you seek a formal ruling on the eligibility of the building from the Keeper of the National Register of Historic Places in the event that the Sarrazin Site is chosen as the preferred alternative;

e) you agree with the consultant that 24PA892 is not eligible for Register listing. Since our office believes the outbuildings will qualify under Criterion C, and the presence of the original domestic structure at the site mitigates addition of a modern dwelling to the farm, we recommend that you also seek a formal Determination of Eligibility for this property if the Sarrazin Site is chosen;

f) you understand that the Section 106 work completed to date will be sufficient for compliance should the Watson or Megis sites be

chosen for the tower. If, however, the Sarrazin Site is chosen, additional cultural resources work will be necessary to resolve eligibility and assess effect for those properties where eligibility judgments differ (d. and e. above). Should the Sarrazin site be chosen, additional work will also have to be devoted to defining the historic homestead and/or rural historic landscape districts the consultant believes may exist in the project area, evaluating their eligibility for listing in the National Register, and addressing effects from the project.

Potential mitigation measures for all Register eligible properties which cannot be avoided will also have to be devised, in the event the Sarrazin site is selected; and

g) you agree with the consultant that if the Foster, O'Hair-North or O'Hair-South sites are selected, a cultural resources survey will have to be completed prior to project construction. Our office concurs with that recommendation as well.

Should your agency select the Watson or Megis Site alternative for construction of the tower, we have no further concerns in Park County. If the Sarrazin Site or any one of the sites listed in (g) above is selected, however, we will anticipate additional consultation.

Thank you for the opportunity to comment, and please do call if you or your consultants have additional questions.

Sincerely,

Katherine M Huppe

Katherine M. Huppe
Historical Survey Reviewer

cc: D. Rutledge, SRI

File: Comp/USAF-GWEN/1990

State Historic Preservation Office
Montana Historical Society
Mailing Address: 225 North Roberts • Helena, MT 59620-9990
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March 20, 1991

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MAR 2 8 1991

Stephen T. Martin, Lt Col
GWEN Project Manager
Department of the Air Force
Headquarters Electronic Systems Division
Hanscom Air Force Base, MA 01731-5000

Re: Finding of Effect
Livingston Ditch, Megis CGS

Dear Lt Col Martin:

Thank you for requesting our comments on your finding of effect for the Livingston Ditch (24PA702), a property eligible for listing in the National Register. We **do concur** with your finding that construction of a GWEN tower as presently located within the Megis Candidate Gwen Site would **have no effect** on the qualities which make the irrigation ditch eligible for listing.

Thank you for the opportunity to comment.

Sincerely,

Katherine M. Huppe

Katherine M. Huppe
Historical Survey Reviewer

key pb.

File: Comp/ USAF-GWEN
CD-Park Ditch

FISH AND WILDLIFE ENHANCEMENT
FEDERAL BUILDING, US COURTHOUSE
301 S PARK
P O BOX 10023
HELENA MT 59626

FWE-61130-Billings
M.37 USAF (GWEN)

April 30, 1992

Stephen T. Martin, Lt. Col., USAF
Program Manager, GWEN
Department of the Air Force
Headquarters Electronic Systems Division (AFSC)
Hanscom Air Force Base, MA 01731-5000

Dear Col. Martin:

This responds to your letter dated April 24, 1992 concerning updating the list of threatened and endangered species to be considered in connection with the Air Force's proposed Ground Wave Emergency Network (GWEN) in "South Central Montana." Your letter also transmitted a copy of a July 18, 1989 "Record of Contact" between members of your staff and Ms Carol Taylor of this office. Ms Taylor listed the bald eagle (Haliaeetus leucocephalus), peregrine falcon (Falco peregrinus), and black-footed ferret (Mustela nigripes) as the species of concern.

Ms Taylor is no longer at this location and it is unclear from your letter just what constitutes the "South Central Montana" GWEN project area. If the area intended is the same as that described in an October 13, 1989 document we have on file entitled, "GWEN RNNE Relay Node 4C925MT, South Central Montana, Site Search Synopsis" (i.e., a 250 square mile area in Park County, MT), then the listed endangered/threatened species, as originally provided by Ms Taylor, remains valid.

We appreciate your efforts to consider and conserve fish and wildlife resources, including threatened and endangered species. If you have questions regarding this letter, please contact Mr. Gary Wood of our Billings Suboffice (406) 657-6750.

Sincerely,

John G. Wood

Dale Harms
State Supervisor
FOR Montana State Office

JGW/jf

cc: Suboffice Coordinator, USFWS, Fish & Wildlife Enhancement (Billings, MT)

"Take Pride in America"

Mailed to

United States Department
of the Interior
Fish and Wildlife Service
Montana State Office
Attn: Mr Dale Harms
Federal Building
301 South Park
P.O. Box 10023
Helena, MT 59626

Stephen T. Martin, Lt. Col., USAF
Program Manager, GWEN
Department of the Air Force
Headquarters Electronic Systems Division (AFSC)
Hanscom Air Force Base, MA 01731-5000

RE: U.S. Air Force Ground Wave Emergency Network (GWEN) Project in South Central Montana

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This is to verify that no changes have been made to the list of federally-designated threatened, endangered, or candidate species sent on April 30, 1992.

Dale Harms

JAN. 8, 1993
Date

Changes have been made to the list of federally-designated threatened, endangered, or candidate species since our correspondence to you on April 30, 1992. Enclosed is a new list of species.

Dale Harms

Date

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To John Isch	From Betty Cox
Co. GTE	Co.
Dept.	Phone # 617-271-8427
Fax #	Fax # 8219

APPENDIX D

GLOSSARY

GLOSSARY

Abbreviations and Units of Measure

AM	Amplitude Modulation
ATU	Antenna tuning unit
BIA	Bureau of Indian Affairs
Btu	British thermal unit
BUPG	Back-up power group
CCHC	Crow Cultural and Historical Commission
CFR	Code of Federal Regulations
CGS	Candidate GWEN site
CRP	Conservation Reserve Program; a 10-year program whereby farmland is not cultivated to prevent erosion
dBA	Decibels on the A-weighted scale, which is a measure of the intensity of the sounds people can hear
DNR	Department of Natural Resources, State of Montana
EA	Environmental Assessment
EPA	Environmental Protection Agency

FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement; in this document, the term refers to the FEIS for the GWEN Final Operational Capability that was released in September 1987 by the U.S. Air Force, Electronic Systems Division, Hanscom Air Force Base, Massachusetts
FIA	Federal Insurance Administration
FICWD	Federal Interagency Committee for Wetland Delineation
FOC	Final Operational Capability, the third phase of development of GWEN
GPO	Government Printing Office
GWEN	Ground Wave Emergency Network
HEMP	High-altitude electromagnetic pulse
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning, the formal review process for the EA
kHz	Kilohertz
kV	Kilovolt
LF	Low frequency
MBEWG	Montana Bald Eagle Working Group

MDFWP	Montana Department of Fish, Wildlife, and Parks
MDHES	Montana Department of Health and Environmental Services
mg/l	Milligrams per liter (1 mg/l = 1 ppm)
MM	Modified Mercalli, a scale of the severity of earthquake effects
MNHP	Montana Natural Heritage Program
µg/l	Micrograms per liter (1 µg/l = 1 ppb)
NCDC	National Climatic Data Center
NPS	National Park Service
NRC	National Research Council, the principle operating agency of the National Academy of Sciences and the National Academy of Engineering
NRHP	National Register of Historic Places
PAWS	Potential areawide sites; the portion(s) of an SSA left after application of those siting criteria that do not require a field survey, such as the location of national and state parks
PCGS	Potential candidate GWEN site; any site that is identified from roadside surveys as suitable for further investigation
PGS	Preferred GWEN site; the CGS identified by the Government that represents the Government's preferred location for a relay tower

ppb	Parts per billion
ppm	Parts per million
PSER	Preliminary Site Evaluation Report
ROE	Right-of-entry
SCS	Soil Conservation Service, a unit of the United States Department of Agriculture
SHPO	State Historic Preservation Officer; the person responsible for administering the National Historic Preservation Act at the state level, reviewing National Register of Historic Places nominations, maintaining data on historic properties that have been identified but not yet nominated, and consulting with federal agencies concerning the impacts of proposed projects on known and unknown cultural resources
SSA	Site search area; the 250-square-mile area within which four to six CGSs are identified; the SSA is the area within a 9-mile radius of a set of nominal coordinates in the network design. It is used as a manageable range in which to conduct siting investigations.
TLCC	Thin Line Connectivity Capability; the second phase of development of GWEN
UHF	Ultrahigh frequency (band); specifically 300 to 3,000 megahertz
USAF	United States Air Force
USC	United States Code

USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VMC	Visual Modification Class

Definitions

Air pollutant	An atmospheric contaminant, particularly the 15 atmospheric contaminants specified in federal and most state regulations
Anaerobic	Occurring in the absence of free oxygen
Candela	A unit of measure of the intensity of light equal to the brightness of one candle
Carboniferous	Period of geologic time from 286 to 360 million years ago
Cretaceous	The geologic period from 144 to 65 million years ago
Cultural resource	Prehistoric, Native American, and historic sites, districts, buildings, structures, objects, and any other physical evidence of past human activity
Devonian	Period of geologic time from 360 to 408 million years ago
Evaluative criteria	Applied to portions of a potential siting area for a GWEN facility to determine its suitability. Areas that rank low against evaluative criteria may be excluded from consideration, or given a low priority in the site selection process

Exclusionary criteria	Criteria used to eliminate or exclude highly sensitive areas or areas that do not meet the limits of acceptable performance from consideration for GWEN facilities
Federal jurisdictional wetland	As defined in the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (GPO 1989-236-985/00336), a wetland is a class of habitats that is distinguished by the presence of saturation to the surface or standing water during at least 1 week of the growing season (wetland hydrology), a soil type characteristic of saturated or poorly drained conditions (hydric soils), and the predominance of plants that only or mostly occur on wet sites (hydrophytic vegetation)
Floodplain	Land adjacent to a river that is commonly covered by water during high flow periods
Glaciated	Areas affected by the former presence of glaciers and continental ice sheets
Ground plane	A part of the antenna system consisting of buried copper wires that extend radially from the base of a GWEN tower for a distance of approximately 330 feet
Historic properties	For the purposes of this EA, historic properties are aboveground structures and resources that are listed or eligible for listing on the National Register of Historic Places
Hydric soil	A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part
Igneous rock	Rock formed from molten state, such as basalt or granite

Jurassic	The period of the Mesozoic era between the Cretaceous and the Triassic or the corresponding system of rocks marked by the presence of dinosaurs and the first appearance of birds
Mackinaw	A flat-bottomed boat with pointed prow and square stern
Modified Mercalli scale	A measure of the intensity of seismic activity based on human perception of the event and potential for damage; the intensity is rated on a Roman numeral scale ranging from I to XII. An earthquake of MM intensity I would be detectable only by seismographs; MM intensity V would shake buildings, break dishes and glassware, and cause unstable objects to fall; MM intensity X would destroy most masonry and frame structures, bend railroad rails slightly, and cause tidal waves and landslides; MM intensity XII would cause nearly total destruction of all buildings. Another commonly used seismic intensity scale, based on readings from a seismograph, is the Richter scale, which was developed in 1935. The Modified Mercalli scale is often used when the historic period to be covered includes data prior to 1935
Metamorphic rock	Rocks that have been transformed through the action of intense pressures and high temperatures, such as marbles (metamorphosed limestones) and slates (metamorphosed shales)
pH	A measure of acidity in which the lower the number, the more acid the substance; 7 represents neutrality
Phase I survey	A survey designed to identify properties that are listed, eligible for listing, or potentially eligible for listing on the National Register of Historic Places within the area that would be affected by the proposed project

Precambrian	The geological periods that preceded the appearance of hard-bodied, multicellular life forms about 600 million years ago
Prime farmland	Land that contains soils having high crop production either naturally or through modification; the U.S. Soil Conservation Service is responsible for designating prime farmland
Rookery	A breeding ground or haunt of gregarious birds or mammals
Sauropod	Any of a suborder (*Sauropoda*) of dinosaurs comprising herbivorous forms with long neck and tail and small head
Sedimentary rock	Rock formed by the consolidation or cementation of particles deposited by water or wind
Tertiary period	Geologic period of time from 2 million to 66 million years ago
Top-loading element	Portions of the GWEN antenna that extend diagonally from the top of the tower, which strengthen the signal and provide additional structural support like guy wires